







Instruction Bulletin - 01.4IB.49200 NDC DC Circuit Breaker Test Cabinet



Contact Information

Powell Electrical Systems, Inc.

powellind.com info@powellind.com

Service Division

7273 Airport Blvd. Houston, Texas 77061

Tel: 1.800.480.7273









Signal Words

As stated in ANSI Z535.4-2011 (R2017), 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", "Caution" and "Notice". These words are defined as:

A DANGER

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

A WARNING

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

A CAUTION

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, is used to address practices not related to personal injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Qualified Person

For the purposes of this manual, a qualified person, as stated in NFPA 70E®, is one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. In addition to the above qualifications, one must also be:

- trained and authorized to energize, deenergize, lock out, tag, clear, and ground circuits and equipment in accordance with established general and site-specific safety practices.
- 2. trained in the proper selection, care and use of personal protective equipment (PPE) including but not limited to insulating gloves, hard hat, safety glasses or face shields, arc flash clothing, etc., in accordance with established general and site-specific safety practices.
- 3. trained in rendering first aid if necessary.



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Ch 1 General Information

A WARNING

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

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

Prior to adjustments, servicing, maintenance, or any act requiring the operator to make physical contact with the equipment, the power source must be disconnected and the equipment grounded. Failure to do so may result in death or serious injury.

NOTICE

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.

NOTICE

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 test cabinets:

- 22309G00005001 125VDC
- 22309G00005002 48VDC

B. Purpose

The information in this instruction bulletin is intended to provide details required to properly operate and maintain the test cabinets described in *Ch 1 General Information*, *A. Scope*.

This instruction bulletin provides:

- 1. Safety guidelines
- 2. General descriptions of the operation and maintenance of the test cabinets
- 3. Instructions for installation and placing the test cabinet into service
- 4. Instructions for part replacement
- 5. Information for ordering renewal parts
- 6. Illustrations, photographs, and description of the test cabinet

The illustrations contained in this document may not represent the exact construction details of each particular type of test cabinet. 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.

A WARNING

Follow the appropriate safety precautions while handling any of the equipment. Failure to do so may result in death or serious injury.

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



Changes to the instruction bulletin may be implemented at any time and without notice.

Go to powellind.com to ensure use of the current instruction bulletin for Powell equipment.

For more information visit *powellind.com*. To contact the Powell Service Division call 1.800.480.7273 or 713.944.6900, or email *serviceinfo@powellind.com*.

For specific questions or comments pertaining to this instruction bulletin email *documents@powellind.com* with the IB number in the subject line.

D. Associated Instruction Bulletins

 01.4IB.25002B Low Voltage Metal-Enclosed Type NDC DC Switchgear Equipped with Brush Type NDC Circuit Breaker









Ch 2 Safety

A. SAFE WORK CONDITION

The information in Section A is quoted from NFPA 70E 2018 - Article 120, 120.5 Establishing an Electrically Safe Work Condition.

120.5 Process for Establishing and Verifying an Electrically Safe Work Condition.

Establishing and verifying an electrically safe condition shall include all of the following steps, which shall be performed in the order presented, if feasible:

- 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. Release stored electrical energy.
- 5. Release or block stored mechanical energy.
- 6. Apply lockout/tagout devices in accordance with a documented and established procedure.
- 7. Use an adequately rated portable test instrument to test each phase conductor or circuit part to verify it is de-energized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the test instrument is operating satisfactorily through verification on any known voltage source.

- Exception No. 1: An adequately rated permanently mounted test device shall be permitted to be used to verify the absence of voltage of the conductors or circuit parts at the work location, provided it meets the all following requirements: (1) It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work; (2) It is listed and labeled for the purpose of verifying the absence of voltage; (3) It tests each phase conductor or circuit part both phase-to-phase and phase-toground; (4) The test device is verified as operating satisfactorily on any known voltage source before and after verifying the absence of voltage.
- **N** Exception No. 2: On electrical systems over 1000 volts, noncontact test instruments shall be permitted to be used to test each phase conductor.
 - Informational Note No. 1: See UL 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical system 1000 volts and below.
- N Informational Note No. 2: For additional information on rating and design requirements for voltage detectors, refer to IEC 61243-1, Live Working Voltage Detectors Part 1: Capacitive type to be used for voltages exceeding 1kV a.c., or IEC 61243-2, Live Working Voltage Detectors Part 2: Resistive type to be used for voltages of 1kV to 36kV a.c., or IEC 61243-3, Live Working Voltage Detectors Part 3: Two-pole voltage type.



- 8. 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 de-energized could contact other exposed energized conductors or circuit parts, apply temporary protective grounding equipment in accordance with the following:
 - a.. Placement. Temporary protective grounding equipment shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to a shock hazard (i.e., hazardous differences in electrical potential). The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning.
 - b. Capacity. Temporary protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.
- N Informational Note: ATSM F855, Standard Specification for Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment, is an example of a standard that contains information on capacity of temporary protective grounding equipment.
 - c. Impedance. Temporary protective grounding equipment and connections shall have an impedance low enough to cause immediate operation of protective devices in case of unintentional energizing of the electric conductors or circuit parts.

B. SAFETY GUIDELINES

Study this instruction bulletin and all other associated documentation before operating the test cabinet.

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 test cabinets.

C. GENERAL

- 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 test cabinet reliability and safety.
- Service conditions 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

- DO NOT WORK ON ENERGIZED EQUIPMENT. If work must be performed, remove the equipment from service.
- 2. ALL CONDUCTORS MUST BE ASSUMED TO BE ENERGIZED UNLESS THEIR POTENTIAL HAS BEEN MEASURED AS GROUND AND SUITABLE GROUNDING CONDUCTORS HAVE BEEN APPLIED TO PREVENT ENERGIZING. Many accidents have been caused by back feeds from a wide variety of sources.
- 3. ALL COMPONENTS SHALL BE DISCONNECTED BY MEANS OF A VISIBLE BREAK AND SECURELY GROUNDED FOR SAFETY OF PERSONNEL PERFORMING OPERATIONS.

E. 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.



Warning and Caution labels are located in various places. Do not remove or deface any of these warning/caution labels.



Ch 3 Equipment Description



Powell is committed to continuous product improvement.

It is possible that improvements occurred between revisions to this document and therefore, may not be described in these instructions. If the equipment does not resemble the photographs and descriptions contained herein, contact Powell before attempting to perform any actions.

A. GENERAL

The test cabinet (Figure 1) is designed to operate NDC DC circuit breakers that have been removed from the switchgear. It provides a safe means for operating the electrical "CLOSE" and "TRIP" circuits of the circuit breaker during maintenance and inspection.

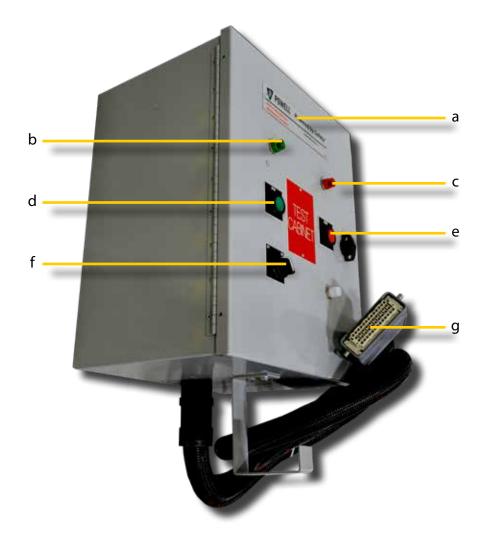








Figure 1 Typical NDC DC Circuit Breaker Test Cabinet



- a. Nameplate
- b. Open Indication Light
- c. Closed Indication Light
- d. Open Push Button
- e. Close Push Button
- f. Test Cabinet Control Power Selector Switch
- g. Secondary Disconnect Plug



Ch 4 Installation

A. RECEIVING

When the test cabinet is received, check for signs of damage. If damage is found or suspected, file claims as soon as possible with the transportation company and notify the nearest Powell representative.

B. STORAGE

Shipping and storage of electrical equipment requires measures to prevent the deterioration of the apparatus over a long unused period. The mechanical and dielectric integrity must be protected. Electrical equipment is designed for use in a variety of environments. When the equipment is in transit and storage, these design considerations are not fully functional. In general, the following measures must be considered.

1. Equipment designed for indoor installation must be stored indoors in a climate controlled environment to prevent condensation of moisture. Exposure to rain and the elements, even for a short period, can permanently damage the equipment. Space heaters within the equipment should be energized, if so equipped. Humidity controlling desiccant materials should be utilized when space heaters are not provided or cannot be energized. The temperature should be kept above 33°F/1°C and below 140°F/60°C. The relative humidity should be kept below 60% or a dew point of 59°F/15°C. The equipment should be stored in such a manner as to leave all doors and panels accessible for inspection. The equipment must be inspected on a routine basis to assure operational integrity.

- 2. Equipment designed for outdoor exposure may be stored either in indoor or outdoor storage locations. The equipment must be protected from airborne external contaminates if stored outdoors. Outdoor storage will also require additional care to maintain temporary covers over the openings and shipping splits. The equipment must be provided with control power to facilitate the energization of space heaters, as well as other temperature and humidity controlling equipment. The temperature should be kept above freezing (>33°F/1°C) and below (<140°F/60°C). The relative humidity should be kept below 60% or a dew point of 59°F/15°C. The equipment should be stored in such a manner as to leave all doors and panels accessible for inspection. The equipment must be inspected on a routine basis to assure its integrity.
- 3. The auxiliary control devices, ship loose material and protective relays must also be protected. This includes items such as battery chargers, UPS systems, lighting, installation hardware and air conditioning. If prolonged storage is anticipated, humidity controlling desiccant materials should be utilized. Desiccant packets should be installed in all compartments and packing containers.

C. Installing Test Cabinet

The test cabinet must be installed so that the secondary disconnect cannot reach a circuit breaker in the connected position. If more assistance is needed, contact Powell Service at *serviceinfo@powellind.com* or call 1.800.480.7273.









Ch 5 Operation

A. GENERAL

Perform the following to test the circuit breaker outside the switchgear:

CAUTION

The test cabinet should be located at least 8 feet away from the switchgear.

A CAUTION

Prior to connecting the test cabinet with the circuit breaker make sure the power switch is in the "off" position. Failure to do so may result in personal injury.

- a. Connect the test cabinet umbilical cord (Figure 1, g) to the circuit breaker secondary disconnect receptacle.
- Rotate the manual trip/truck lock handle to the locked position otherwise the electrical circuits on the DC breaker will not be able to be activated.
- c. Turn the test cabinet power switch (Figure 1, f) to the **ON** position. This will charge the CBCM capacitors after ~5 seconds.
- c. Push the "Close" push button (Figure 1, e) on the test cabinet. The breaker will close and can be verified by viewing a red "1" on the front of the breaker fascia. The red closed indication light (Figure 1, c) will be illuminated.
- d. Push the "Open" push button (Figure 1, d) on the test cabinet to trip the circuit breaker. The breaker will trip and can be verified by viewing a green "0" on the front of the breaker fascia. The green indication light (Figure 1, b) on the test cabinet will be illuminated.



Figure 2 NDC DC Circuit Breaker Test Cabinet - Dimensions and Mounting Hole Locations

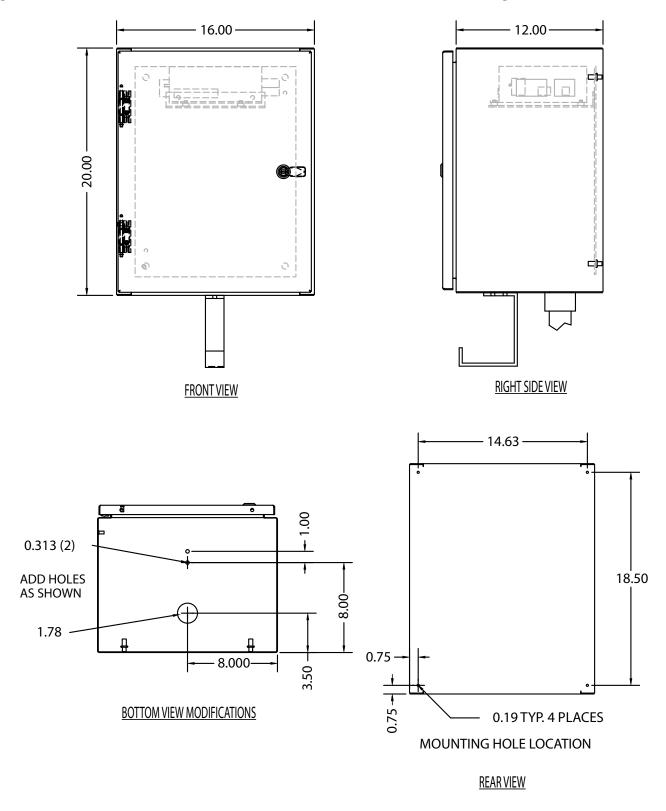










Figure 3 Wiring Schematic - 48VDC Test Cabinet

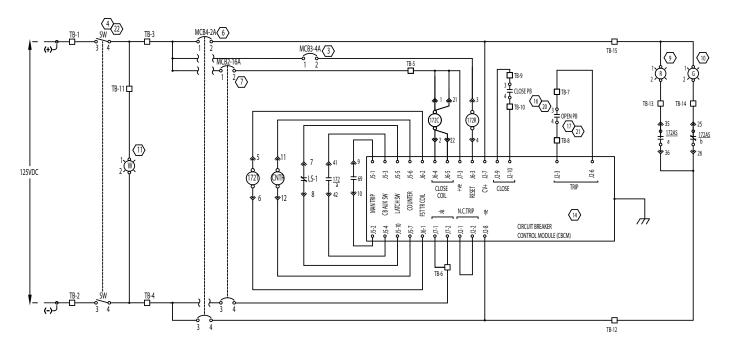
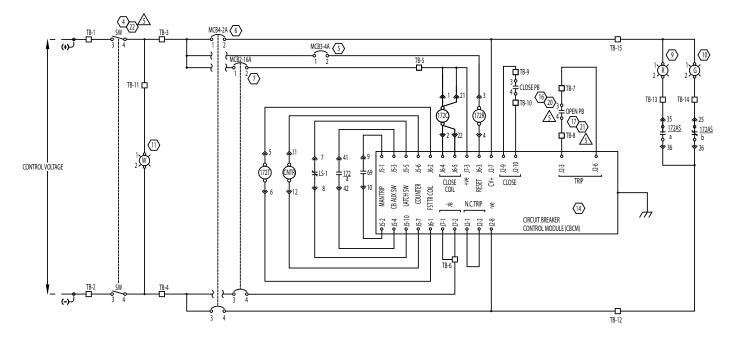


Figure 4 Wiring Schematic - 125VDC Test Cabinet





Ch 6 Recommended Renewal Parts and Replacement Procedures

A. ORDERING INSTRUCTIONS

- 1. Order Renewal Parts from Powell at *powellind.com* or call 1.800.480.7273.
- 2. Specify the quantity and description of the part and the instruction bulletin number. If the part is in any of the recommended renewal parts tables, specify the catalog number. If the part is not in any of the tables, a description should be accompanied by a marked illustration from this instruction bulletin, a photo or simply submit a sketch showing the part needed.





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