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*These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the Powell Electrical Mfg. Company.*
Before any adjustments, servicing, parts 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.

INTRODUCTION

P-5000 Air-Interrupter Equipment is designed to comply with ANSI Specification C37.20 “IEEE Standard for Switchgear Assemblies Including Metal-Enclosed Bus”, and may be described as metal-enclosed, three pole, gang-operated, quick-make, quick-break, stationary-disconnect switch with an integral interruptor and stored-energy spring. Individual air-interrupters are designed for specific applications dictated by the Purchaser’s specifications and needs.

These instructions are prepared as a guide to handling, installation, operation, and maintenance of P-5000 equipment.

The intent of these instructions is to give the Purchaser the necessary general information to identify his switch as to type and function, to describe suggested methods of installation, and to demonstrate some techniques of operation and maintenance. Separate instructions covering components are not included in this publication, but are available upon request. The Purchaser should interpret these instructions for applicability to his particular equipment by referring to the drawings supplied with the switch.

DESCRIPTION

GENERAL

The basic P-5000 Interrupter is an assembly of components and conductors for switching, arranged for convenient access, in an enclosure which allows space and facilities for cable termination, plus safety interlocking of doors to prevent inadvertent entrance to high-voltage parts. It can be applied in combination with power fuses and other protective devices to provide safe, low-cost switching and circuit protection. Installation, operation, and service should be performed only by experienced personnel trained in this class of equipment.

P-5000 Air-Interrupter Equipments are normally applied when economics, duty cycle and other application requirements dictate the use of a device less sophisticated than a power circuit breaker. The equipment is designed for indoor and outdoor service and for either top or bottom incoming line or feeder connection.

P-5000 equipment consists of:
- Line-up equipments—(Fig. 1)
- Single-Unit equipment—(Fig. 3)
- Load center incoming line equipment—(Fig. 4, 5, 6)

a.) Line-Up Equipment:

Line-up equipment consists of two or more front accessible units containing horizontal bus of 600 or 1200 amp, connecting various combination of incoming line units, tie units and feeder units together. Viewing Windows (Fig. 2) are provided on the front so that a flashlight can be used to illuminate the switch. A mechanical position indicator is also provided for switch position in the escutcheon over the switch operating shaft.
The lower fuse door is mechanically interlocked with the upper door to prevent entry when the switch is energized.

600 or 1200 amp main horizontal bus is located in the upper area of the compartment. Removing top covers, rear panels or rear cover sheets provides access to the main bus. When required the ends of the equipment have provisions for future bus extension. Optional accessories provided in the equipment include: potential transformers, current transformers, surge arrestors, instrumentation, etc. in numerous combinations.

b.) Single Unit Equipment:

Single-Unit equipment permits rear access to the incoming line and load cables entering the unit, in any combination from above or below. Except for the omission of the main horizontal bus, features are similar to those of line-up equipment.

c.) Load Center Incoming Line Equipment:

This interrupter is a three pole, two position (open-closed) switch with all three poles operated simultaneously by a removable handle on the front of the switch compartment. The switch provides a visible air break in the primary circuit when the station is disconnected.

Where there are two separate incoming lines, the three-position (Line1/Open/Line 2) type interrupter selector switch provides maximum service continuity by allowing the operator to switch from one incoming line to the other in case of failure of the primary feed, or to open for planned maintenance.

The switch consists of a two-position (open-closed) air-interrupter switch in series with a two-position (Line 1/Line 2) selector switch. The selector switch is a dead-break device mechanically interlocked so it cannot be operated unless the interruptor switch is open.

Where there are two separate incoming lines, the three-position (Line 1/Open/Line 2) double interrupting switch provides maximum service continuity by allowing the operator to switch from one incoming line to the other in case of failure of a primary feeder, or to OPEN for planned maintenance.

The switch consists of two two-position (open-closed) air-interrupter switches connected in parallel on the load side, key-interlocked so both incoming line switches cannot be closed at the same time. The double break interrupter switch has the advantage of isolating two lines permitting maintenance of one while the other is energized and reducing the probability of transfer of a fault on one cable to the other.
RATINGS

Refer to the specific job drawings for detailed ratings applicable to a particular interrupter. Equipment basic ratings are summarized below:

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal 4.8kV</th>
<th>Nominal 13.8kV</th>
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<tr>
<td>Continuous Rating</td>
<td>600A</td>
<td>1200A</td>
</tr>
<tr>
<td></td>
<td>600A</td>
<td>1200A</td>
</tr>
<tr>
<td>Max Design (kV)</td>
<td>5.5kV</td>
<td>15.5kV</td>
</tr>
<tr>
<td>60-Cycle Withstand (kV)</td>
<td>19</td>
<td>36</td>
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<tr>
<td>BIL (kV)</td>
<td>60</td>
<td>95</td>
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<tr>
<td>Interrupting Ratings</td>
<td>600A</td>
<td>1200A</td>
</tr>
<tr>
<td></td>
<td>600A</td>
<td>600A</td>
</tr>
<tr>
<td>Momentary Amps</td>
<td>40,000</td>
<td>60,000</td>
</tr>
<tr>
<td></td>
<td>40,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Fault Close Amps</td>
<td>40,000</td>
<td>60,000</td>
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<td></td>
<td>40,000</td>
<td>60,000</td>
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FACTORY DIELECTRIC TEST

19,000 volts for 4.8kV class interrupters. 36,000 volts for 13.8kV class interrupters.

NOTE: Field Dielectric Tests, if required, should be limited to 75% of Factory Dielectric Test values.

STORAGE

In the event installation cannot be made immediately, the equipment should be stored in a clean, dry, ventilated location. Should the equipment be subjected to either low temperature or moisture, approximately 250W of heat per section should be introduced.

CAUTION: Indoor equipment should not be stored outdoors, even if completely covered with tarpaulin or plastic sheet.

HANDLING

It is always preferable to handle P-5000 Interrupters with overhead cranes, by the lifting means provided. Figure 7 shows the recommended method of lifting an outdoor non-walk-in lineup.

NOTE: For outdoor walk-in enclosures, lifting channels are provided attached to the base of the equipment, and spreaders should be used in the slings above the enclosure to prevent damage to the top edges. Do not attempt to lift the equipment by using the angles installed on the sides, as these angles are provided only to insure the equipment will not tip if top-heavy by tying it down during shipment, and are not intended to be used for lifting purposes. Slings should be tied to referenced angles to prevent tipping.

If bases are furnished, the equipment may be moved on an even surface by the use of rollers or heavy duty pipe under the base. Any force to move or jack the equipment must be applied to the base and not to the equipment.

RECEIVING, STORAGE AND HANDLING

RECEIVING

P-5000 Interrupters are fabricated as rigid, floor-mounted self-supporting steel sections. They are shipped in an upright position and, when received, should be kept upright.
INSTALLATION

POSITIONING OF ENCLOSURE

When the equipment has been put into place, it should be checked for levelness, and shimmed if necessary. The equipment can then be bolted to the floor by means of half-inch bolts—for which holes are provided in the front and rear of the bottom of the enclosure. Refer to the outline furnished with each piece of equipment for the floor plan showing the location of these bolts.

GROUNDING

The enclosure must be grounded before making any power connections. A ground bus is furnished with lugs at each end for connection to the grounding system.

POWER CABLE TERMINATION

Refer to specific job drawings for recommended and available conduit space for top or bottom entry.

In any installation, the cable should be prepared for termination in accordance with the instructions of the cable manufacturer. However, the following general recommendations are given for proper cable termination in P-5000 equipment:

1. Pull in the cables in accordance with the equipment outline diagram and position them for maximum clearance between phases, ground and other cable or wire runs. Refer to the specific job drawings for recommended location of incoming cables.

2. Prepare the cable for termination in accordance with the manufacturer's instructions.

3. Bolt the cable terminals to the bus or other point of termination.

4. If contact between the cable and an adjacent bus cannot be avoided, tape the bus in the immediate vicinity of the cable contact point.

5. Run all the low-voltage wires so as to avoid any possible contact with high-voltage lines.

INTERLOCKS

(a) After initial installation of the switchgear equipment, all necessary interlock keys should be inserted into the appropriate locks and all spare keys should be placed in the hands of a responsible person. This precaution is necessary since improper use of spare keys will defeat the interlocking scheme.

(b) All fused switches are equipped with a mechanical interlock that prevents opening the fuse door until the switch is first opened.

MECHANICAL OPERATION CHECK

Refer to furnished instruction manual for preoperational checks on the load break switch.

TESTING AND INSPECTION

After the equipment has been installed and all connections made, it must be tested and inspected before putting it in service. Although the equipment and devices have been tested at the factory, a final field test must be made to be sure that the equipment has been properly installed and that all connections are correct. The primary equipment must be completely de-energized while the tests are in progress.

The extent of the tests on the equipment as a whole will depend on the type and function of the equipment. Tests which should be performed, however, include air-interrupter switch operation, phasing, and grounding checks.

High potential tests to check the integrity of the insulation are not necessary if the installation instructions in this book are carefully followed. If the purchaser wishes to make high potential tests the voltage should not exceed 75% of the factory test voltages.

Potential transformers and control power transformers must be disconnected during high voltage testing.

Directions for testing instruments and meters are given in the instruction book furnished for each device.
MAINTENANCE

A periodic maintenance schedule must be established to obtain the best service from the switchgear. An annual check and overall maintenance procedure for the switchgear devices and all connections, must be followed as a minimum requirement. Equipment subject to highly repetitive operation may require more frequent maintenance.

A permanent record of all maintenance work must be kept. The record should include a list of periodic checks and tests made, the date they were made, the condition of the equipment, and any repairs or adjustments that were performed. Maintenance employees must follow all recognized safety practices, such as those contained in the National Electrical Safety Code and in company or other safety regulations during maintenance.

WARNING: Solid insulation surrounding an energized conductor and power apparatus must never be relied upon to provide protection to personnel.

For specific information regarding the maintenance of devices, such as load break switch, lightning arresters, meters, etc., refer to the separate instruction book furnished for each device.

Bus
(a) Before any covers are removed or any doors opened which permit access to the primary circuits, it is essential that the circuits be de-energized.

(b) Check that all bus mounting bolts and splice connection bolts are tight.

(c) Wipe and vacuum clean the busses and supports.

Feeder Cable & Primary Cable Terminations
(a) Inspect all main cable connections for signs of overheating, and tighten all connections.

(b) Check that all secondary control wiring connections are tight and all control cabling is intact.

(c) Check all bolts that secure the terminals for tightness.

(d) Check the ground bus connection and mounting bolts for tightness, and clean the ground bus.

Overall Switchgear
(a) Clean and inspect all painted surfaces and retouch where necessary.

(b) Check to see that all anchor bolts and other structural bolts are tight.

(c) Check that all doors operate properly.

DEVICES & COMPARTMENTS

Switches-Test and inspect all switches for proper operation as described in interrupter instruction manual provided with switch.

Check and inspect all devices to see that they are functioning properly. Check that all electrical connections are tight. Check mounting of the devices.

Compartment Interiors
(a) Thoroughly clean interior of compartments. Use a vacuum cleaner and clean rags only. Do not use steel wool, or oxide papers. Blowing with compressed air is not recommended.

(b) Check indicating devices, mechanical and key interlocks.

RENEWAL PARTS

Ordering Instructions
1. Renewal parts should be ordered from the nearest Sales Office of Powell Electric Mfg. Co.

2. Always specify the shop order number on which the equipment was originally furnished.

3. Specify the quantity, reference number, description and this Bulletin number. Give complete nameplate rating of the equipment.

4. Standard hardware, such as screws, bolts, nuts, washers, etc., is not listed. Such items should be purchased locally.
SCOPE OF MANUFACTURE
POWELL ELECTRICAL MFG. COMPANY

PANELBOARDS
Lighting and distribution -
Powell P-1000 Line

MOTOR CONTROL CENTERS
A-C Motor Control - Low Voltage, 600 Volts -
Powell Iso-Trol® P-32000 Line
A-C Motor Control - High Voltage, 2.5 and 5 kV
NEMA Class E, Powell P-31000 Line

SWITCHGEAR
Metal-Enclosed A-C Switchgear — 600 Volts -
Powell P-3000 Line
Metal-Clad Switchgear — 1000 MVA, 13.8 kV -
Powell P-4000 Line

UNIT SUBSTATIONS
Secondary Integral Substations and Transformers -
Powell P-5000 Line

CONTROL SWITCHBOARDS
Vertical, Duplex, Benchboard Types -
Powell P-8000 Line

P C R BUILDINGS
Power Control Rooms — Complete Climatized
Buildings with Electrical and Instrumentation
Equipment - Powell P-27000 Line

POWELL APPARATUS SERVICE
Worldwide Service for Electrical Gear Including
Planned Maintenance and Emergency Service.