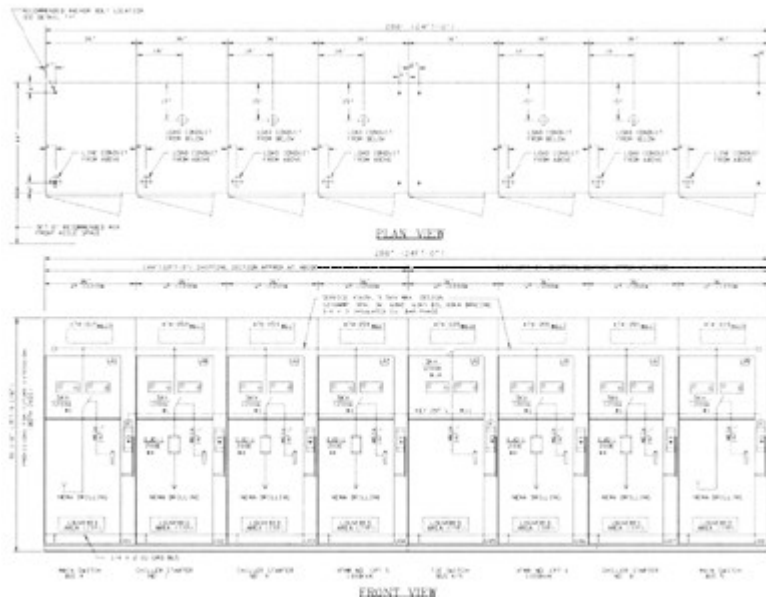


INSTRUCTION BOOK

METAL ENCLOSED LOAD BREAK INTERRUPTER SWITCHGEAR

(Visual-Audio VHS Tapes on Safety, Maintenance, Inspection, and Operation are recommended for use with this Instruction Book. Order TP002 Parts 1, 2, 3)



**IN ADDITION TO THE PERSONNEL PROTECTION PRECAUTIONS AS OUTLINED WITHIN, REFER TO ANSI STANDARD Z 244.1-1982, ENTITLED:
PERSONNEL PROTECTION - LOCKOUT/TAGOUT OF ENERGY SOURCES MINIMUM SAFETY REQUIREMENTS.**

These instructions may not cover all details or variations in equipment, nor provide for every possible contingency encountered. Should further information be desired or should problems arise which are not covered sufficiently, the matter should be referred to the POWERCON CORPORATION

**WARNING
IMPORTANT**

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THIS BLOCK, FAILURE TO DO SO CAN RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH



DO NOT REMOVE COVERS, OPEN DOORS, OR WORK ON EQUIPMENT UNLESS POWER HAS BEEN TURNED OFF AND ALL CIRCUITS DE-ENERGIZED AND DISCONNECTED. DISCONNECT, DE-ENERGIZE, LOCKOUT AND PROPERLY GROUND CIRCUIT(S) BEFORE WORKING ON THIS EQUIPMENT. USE PROPER SAFETY PRECAUTIONS WHEN WORKING ON THIS EQUIPMENT.

ALL SAFETY CODES, SAFETY STANDARDS, AND/OR REGULATIONS AS THEY MAY BE APPLIED TO THIS TYPE OF EQUIPMENT MUST BE STRICTLY ADHERED TO. BEFORE ANY ADJUSTMENTS, SERVICING, PARTS REPLACEMENT OR ANY OTHER ACT IS PERFORMED REQUIRING ANY PHYSICAL CONTACT WITH THE ELECTRICAL COMPONENTS OR WIRING OF THIS EQUIPMENT, THE POWER SUPPLY MUST BE DISCONNECTED.



IN ADDITION TO THE PERSONNEL PRECAUTIONS AS OUTLINED, REFER TO:

- Z244.1-1982 PERSONNEL PROTECTION LOCKOUT/TAGOUT OF ENERGY SOURCES MINIMUM SAFETY REQUIREMENTS
- ANSI/NFPA 70E-1988: ELECTRICAL SAFETY REQUIREMENTS FOR EMPLOYEE WORKPLACES
- ANSI/NFPA 70B-1988: ELECTRICAL EQUIPMENT MAINTENANCE



THE EQUIPMENT COVERED BY THIS INSTRUCTION BOOK MUST BE SELECTED FOR A SPECIFIC APPLICATIONS AND IT MUST BE INSTALLED, OPERATED, AND MAINTAINED BY QUALIFIED PERSONS WHO ARE THOROUGHLY TRAINED AND WHO UNDERSTAND ALL OF THE HAZARDS INVOLVED. As with any electrical apparatus, the thorough knowledge of the engineering safety, inspection, maintenance and repair techniques as well as being familiar with particular features of the apparatus involved is mandatory. THIS BOOK DOES NOT PROVIDE SUFFICIENT INSTRUCTIONS FOR INEXPERIENCED ELECTRICIANS OR UNQUALIFIED PERSONS TO DO ANY WORK REQUIRED INCLUDING THE HANDLING, INSTALLATION, TESTING, OPERATION, INSPECTION, MAINTENANCE, AND REPAIR.



BEFORE CHECKING OR MAINTENANCE OF SWITCHGEAR, AFTER IT HAS BEEN INSTALLED - THE FOLLOWING MUST BE OBSERVED: ONLY QUALIFIED PERSONS MAY OPERATE, INSPECT OR MAINTAIN POWER SWITCHGEAR. IN ADDITION TO THE PERSONNEL YOU MAY HAVE WHO ARE QUALIFIED, OTHERS MAY BE AVAILABLE FROM AN EXPERIENCED HIGH VOLTAGE CONTRACTOR OR THE UTILITY SERVICING THE INSTALLATION. IT IS THE RESPONSIBILITY OF THE PURCHASER, INSTALLER, OR ULTIMATE USER TO INSURE THAT THE WARNING SIGNS ARE NOT REMOVED AND TO MAKE SURE THAT ALL ACCESS DOORS, AND OPERATING HANDLES ARE SECURELY LOCKED WHEN THE GEAR IS LEFT UNATTENDED BY QUALIFIED PERSONS, EVEN MOMENTARILY.



SAFETY GROUNDING TO BE DONE ON DE-ENERGIZED EQUIPMENT ONLY.

Before energizing the equipment and prior to any testing it is recommended that all circuits be safely grounded. Prior to any grounding whether it be for any testing, inspection, or maintenance procedures, assure that all safety precautions are taken. It is further recommended that an appropriate properly operating glow tube instrument that lights up and warns the worker when held in any alternating current field, indicating the presence of voltage, be used prior to grounding.

PERSONNEL DOING SUCH WORK SHOULD WEAR LINEMAN'S PROTECTIVE EQUIPMENT IN ACCORDANCE WITH SUCH EQUIPMENT MANUFACTURER'S RECOMMENDATIONS INCLUDING BUT NOT LIMITED TO PROTECTIVE GLOVES, INSULATED SLEEVES, LINEMAN'S BLANKETS, INSULATED HELMETS, FACE AND EYE PROTECTION that will assist in preventing injury if for any reason the equipment is grounded to an energized circuit. Every precaution should be taken to prevent electrical grounding on an energized circuit. Suitable grounding clamp leads should be used and safety grounding techniques employed. ALL SUCH GROUNDS MUST BE REMOVED AFTER TESTING, INSPECTION, OR MAINTENANCE PRIOR TO ENERGIZING THE EQUIPMENT.

In as much as Powercon has no control over the use to which others may put this material, statements concerning uses of the materials described herein are not to be construed as suitable for these used unless proper technology in the usage, applications, and maintenance are strictly observed. For further information call or write the Powercon Corporation.



LIMITED WARRANTY

Powercon warrants that the equipment we deliver will be of the kind and quality described in the order or contract and will be free of defects in workmanship and material. Should any failure to conform to this warranty appear within one year after date of shipment, Powercon shall upon prompt notification thereof and substantiation that the equipment has been stored, installed, operated and maintained in accordance with Powercon recommendations and standard industry practice, correct such nonconformities, at its option, either by repairing any defective part or parts or by supplying a repaired or replacement part or parts F.O.B. factory. However, if Powercon has installed the equipment or furnished field engineering services with respect to its installation, and provided such installation has not been delayed by the Purchaser, said one year shall run from the completion of the installation. The total warranty period shall not exceed 18 months from the date of shipment in any case.

In no event shall Powercon be responsible for providing working access to the defect, including the removal, disassembly, replacement or reinstallation of any equipment material or structures to the extent necessary to permit Powercon to perform its warranty obligations, or transportation costs to and from the Powercon factory or repair facility. The conditions of any tests shall be mutually agreed upon and Powercon shall be notified of, and may be present at, all tests that may be made.

THE WARRANTIES SET FORTH IN THIS PROVISION ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE), EXCEPT OF TITLE AND AGAINST PATENT INFRINGEMENT. The remedies provided above are the purchaser's sole remedies for any failure of Powercon to comply with its obligations. Correction of any nonconformity in the manner and for the period of time provided above shall constitute complete fulfillment of all the liabilities of Powercon whether the @ of the Purchaser are based in contract, in tort (including negligence) or otherwise with respect to or arising out of the equipment furnished hereunder.

WARRANTY IMPLEMENTATIONS AND CONDITIONS

On those occasions where service help is required, the Powercon Corporation should be notified at once through its Service Department. No charges or expenses should be incurred except as authorized by the Corporation in writing. Making unauthorized corrections or doing unauthorized work voids this Warranty and renders reimbursement impossible.

At times, the Powercon Corporation may request labor and/or material services from you. At our option we will provide competent supervision who will authorize such services by signing the Time Sheets of the people involved. No reimbursement can be made without signed Time Sheets.

The services rendered must be of the type and quality satisfactory to the Powercon Corporation, and we reserve the right to reject any and all such services.

The above in no way prejudices the right of the Powercon Corporation to correct, as stipulated in the Warranty, any problems that may occur in equipment manufactured by the Powercon Corporation.

FOREWORD

The warranty associated with this equipment is fully described with its implementation on Page i. It should be emphasized that unless approved by the Powercon Corporation no modification, alteration, change or correction should be undertaken without such express authority provided in writing by an authorized Powercon representative.

This Instruction Book is furnished in "As is" condition. No warranties expressed or implied, including warranties of fitness for a particular purpose, or merchantability, or warranties arising from course of dealing or usage of trade are made regarding the information, recommendations, descriptions, and safety notations contained herein. In no way will Powercon be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any direct special, indirect, incidental, or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant, or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing power facilities, or claims against the user by its customer resulting from the use of information, recommendations, descriptions, and safety notations contained herein.

The information, recommendations, descriptions, and safety notations in this document are based on Powercon's experience and judgment in respect to all of the subject matter contained herein. This information must not be considered to be all inclusive or covering all contingencies.

QUALIFIED PERSONNEL ONLY

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THIS BLOCK. FAILURE TO DO SO CAN RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH

The equipment covered by this Instruction Book must be selected for a specific application and it must be installed, operated and maintained by qualified persons who are thoroughly trained and who understand all of the hazards involved. As with any electrical apparatus the thorough knowledge of the engineering safety, inspection, maintenance and repair techniques and familiarity with particular features of the apparatus involved is mandatory. This book does not provide sufficient instructions for inexperienced electricians or unqualified persons to do any work required including the handling, installation, testing, operation, inspection, maintenance, and repair. Refer to OSHA 29CFR Part 1910.399 for definition of "qualified person".

WARNING SAFETY GROUNDING

TO BE DONE ON DE-ENERGIZED EQUIPMENT ONLY

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THIS BLOCK. FAILURE TO DO SO CAN RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH

Before energizing the equipment and prior to any testing or maintenance it is recommended that **all** circuits be safely grounded. Prior to any grounding whether it be for any testing, inspection, or maintenance procedures, assure that all safety precautions are taken. It is further recommended that an appropriate properly operating glow tube instrument that lights up and warns the worker when held in any alternating current field, indicating the presence of voltage, be used prior to grounding

Personnel doing such work should wear lineman's protective equipment in accordance with such equipment manufacturer's recommendations including but not limited to protective gloves, insulated sleeves, lineman's blankets, insulated helmets, face and eye protection that will assist in preventing injury if for any reason the equipment is grounded to an energized circuit. Every precaution should be taken to prevent electrical grounding on an energized circuit. Suitable grounding clamp leads should be used and safety grounding techniques employed. All such grounds must be removed after testing, inspection, or maintenance prior to energizing the equipment.

The above in no way replaces the user's safety techniques or applicable safety codes, rules, or regulations.

PLAN YOUR INSTALLATION

In addition to planning for installation of Powercon manufactured equipment, consideration must be given to receiving and handling. Included below are some of the problems that can occur with inadequate planning. Accordingly, please note shipping sections, and weights and dimensions as noted on the drawings.

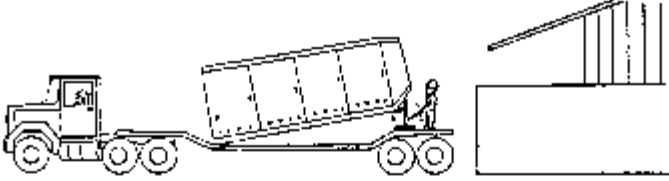

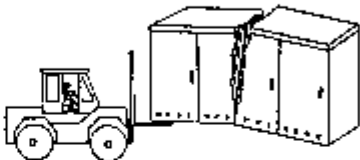
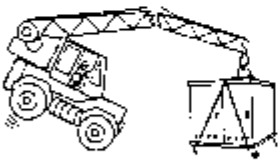
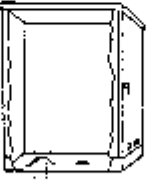
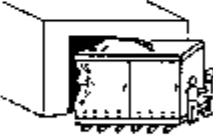
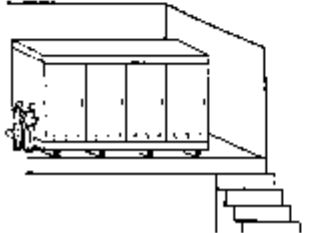
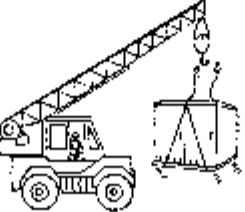
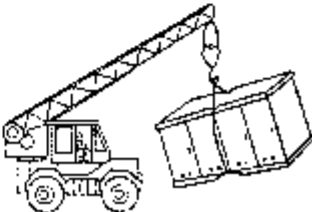
		
BED TOO LOW (BY SAME TOKEN) TRUCK BED COULD BE TOO HIGH		
		
MAKE SURE YOUR CONCRETE PAD IS LEVEL	FORKS ARE TOO SHORT - CHECK BOTTOM	
		
SELF EXPLANATORY	PUT CONDUIT IN RIGHT PLACE	DOOR NOT LARGE ENOUGH
		
A LITTLE DIFFICULT TO MANEUVER	SOMETIMES THE SLINGS ARE WEAK	SPREADER BAR SHOULD BE USED

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INTRODUCTION

The Powercon Metal-Enclosed Load Break Interrupter Switchgear represents the latest design in medium voltage high current switching equipment. The switchgear provides an efficient means for connecting and disconnecting electric power systems. The simple design of the Stored Energy Mechanism insures positive and constant closing force of main blades, even the variations of the manual closing controls. With the addition of electrical operation and overcurrent protection, the Type PIF switch provides an economical means of power circuit control and switching suitable for a wide and varied range of application.

APPLICATION

Powercon Load Break Interrupter switches are applied in the control and switching of power distribution systems having nominal A.C. voltage ratings from 2.4KV to 34.5KV. They are capable of switching 600 and 1200 amperes. Table I lists the applicable limits and conditions of switching. These switches are available with either electrical or mechanical operators. When used in conjunction with fuses, they will afford overload, short circuit and disconnect services. These switches are used: On the primary of transformers for their protection and isolation, For the protection and isolation of single circuit systems, For the protection of isolation of multi-circuit systems and For automatic transfer schemes where their ratings are not exceeded.


APPLICABLE INDUSTRY STANDARDS

NEMA SG-5	Power Switchgear Assemblies
ANSI C37.20.3	Metal-Enclosed Interrupter Switchgear
ANSI C37.30	Requirements for High-Voltage Air Switches
ANSI C37.31	Indoor Apparatus Insulators (For High-Voltage Switches)
ANSI C37.32	Preferred Ratings and Manufacturers Spec. for High-Voltage Switches
ANSI C37.33	Rated Control Voltages and Ranges for High-Voltage Switches (Motor Operated)
ANSI C37.34	Test Code for High-Voltage Air Switches
ANSI/NFPA70B	Electrical Equipment Maintenance

TABLE 1 INDOOR AIR INTERRUPTER SWITCH RATINGS*
(These ratings apply to Switches & Equipments with Stored Energy Operated Switches)

VOLTAGE RATINGS				CURRENT RATINGS				
NOMINAL kV, RMS	MAX. DESIGN kV, RMS	1 MIN. POWER FREQ. WITHSTAND kV	1.2 X 50 IMPULSE WITHSTAND k PEAK, kV	CONTINUOUS AMPERE, RMS	LOAD SWITCHING, AMP, RMS	SHORT TIME RATINGS		FAULT CLOSE
						MOMENTARY ASYM. kA, RMS	3-SEC kA, RMS	
4.16	4.76	19	60	600 1200	600 1200	40,000 61,000	25,000 38,000	40,000 61,000
7.2	8.25	26	75	600 1200	600 1200	40,000 61,000	25,000 38,000	40,000 61,000
13.8	15.0	36	95	600 1200	600 1200	40,000 61,000	25,000 38,000	40,000 61,000
14.4	15.5	50	110	600 1200	600 1200	40,000 61,000	25,000 38,000	40,000 61,000
23.0	25.8	60	125	600 1200	600 1200	40,000 40,000	25,000 25,000	40,000 40,000
34.5	38.0	80	150	600 1200	600 1200	40,000 40,000	25,000 25,000	40,000 40,000
34.5	38.0	80	200	600 1200	600 1200	40,000 40,000	25,000 25,000	40,000 40,000

SAFETY FEATURES


SEVERN MCG

MODEL SERIAL

VOLTAGE CYCLE PHASE AMPS

WARNING IMPORTANT

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WARNING

DO NOT EXCEED NAMEPLATE RATINGS OF SWITCHGEAR. TO DO SO COULD CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

WARNING

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

NEVER ATTEMPT TO OPERATE THE POWERCON SWITCH WITH KEY INTERLOCK BOLT IN EXTENDED POSITION. DAMAGE TO THE OPERATING MECHANISM AND/OR SEVERE INJURY COULD RESULT.

SAFETY FEATURES

Type PIF load interrupter switches have several built-in features to reduce hazards and to provide proper operating sequences.

1. A door interlock prevents opening enclosure front door while the switch is in the closed position.
2. A switch interlock prevents manual operation of the handle mechanism with the door open.
3. A viewing window is provided to verify each switch contact position.
4. Facility for padlocking the switch in the open position is provided.
5. Facilities for padlocking the door handles closed are provided.
6. Mechanical indicators show whether the switch is open or closed.
7. Key interlocks, when provided, force a sequence of operation.

**WARNING
IMPORTANT**

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

OBSERVE AND PRACTICE ALL WARNINGS NOTED ON OTHER PAGES THROUGHOUT THIS PUBLICATION. APPLYING AND REMOVING SAFETY GROUND IS DISCUSSED ON PAGE ii.

SAFETY PRACTICES

To include but not limited to the following.

Only qualified electrical workers with training and experience on high voltage circuits should be permitted to work on this equipment. They should be familiar with the work to be performed, the safety equipment required and the hazards involved.

- 1. Read and understand these instructions before attempting any assembly, installation, operation, inspection, testing, or maintenance of the switchgear.**
- 2. These load interrupter switches are designed to operate within the current and voltage limitations on the e switch nameplate. Do not apply these switches to systems with current and/or voltages exceeding the limits.**
- 3. Disconnect all power sources before making any adjustments or performing maintenance, inspection, or testing.**
- 4. After operating the switch and before opening door, use viewing window to insure that all three switches blades are open. If necessary, use a flashlight to verify all three contacts are open. Do the same for closing.**
- 5. There are several interlocks on the switches. They are for personal and/or equipment protection. Under no circumstances should they be made inoperative. To do so could cause bodily injury or property damage.**
- 6. Never energize the switch without the arc chutes and barriers installed in place. Hinge and jaw contacts must be correctly tightened. Do not overtighten or switch may not close or open.**
- 7. Always be sure that all switch hardware is in place and tightened properly. Refer to Maintenance Note.**
- 8. Before replacing covers, closing doors, or energizing, carefully inspect bus work and phase barriers to insure that no tools or other objects are accidentally left inside the unit.**

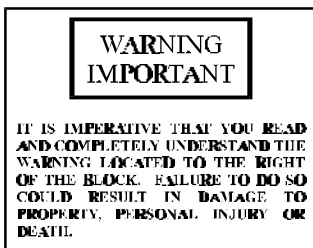
RECEIVING

Upon receipt of the load break interrupter switchgear, immediately make an examination for any damage or loss sustained in shipment. This pertains the housing as well as the load break switch and mechanism. If injury, loss or rough handling is evident, a written damage claim should be filed at once with the transportation company and the Powercon Corporation should be notified at the same time. Be sure that no loose parts are left in the packaging material. Vacuum out any dirt or loose particles of packing material on or around the load break switch mechanism. Study the erection drawing carefully and check the bill of material to be sure that all parts are on hand.

STORAGE

When the unit is not to be placed in service immediately, it should be stored in a clean, dry location and covered with a suitable cover. Moisture absorbing material should not be used to cover the equipment as that could cause corrosion of parts. During the construction period it should be properly protected against construction environment conditions such as moisture, dirt, cement, rough handling, abrasion or damage, etc.

When dampness or condensation exists, the equipment must be covered with a suitable vented cover to allow moisture to escape. Heaters of 250 watts rating should be placed in each unit to prevent moisture damage. **IF EQUIPMENT HAS BEEN SUBJECTED TO MOISTURE IT SHOULD BE TESTED WITH A 1000V MEGGER. A READING OF 200 MEGOHMS SHOULD BE OBTAINED.**



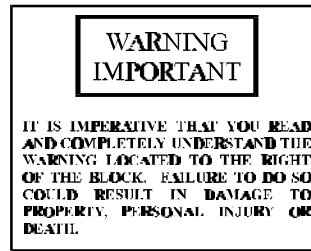
WARNING
**REMOVE ALL
FLAMMABLE
MATERIALS AWAY
FROM HEATERS PRIOR
TO ENERGIZING**

HANDLING

Prior to moving the equipment, please note possible problems under section PLAN YOUR INSTALLATION (page iii), which may arise due to improper handling. Equipment may be moved by a crane with slings. If a crane is not available, rollers may be used. Figure I shows suggested methods of handling the switchgear.

INSTALLATION

ANSI C37.20.3 8.2.4 Installation



"Installation of Metal Enclosed Interrupter Switchgear must only be done with de-energized switchgear. When installing the switchgear: (a) Protect workers adequately from live parts with barriers, screens, etc., (b) Observe National Electrical Safety Code ANSI C2, Rule 124 for guarding live parts."

ANSI C37.20.3 8.2.5 Removal of Shipping Members

"Before any installation of Metal Enclosed Interrupter Switchgear a careful check should be made to insure that all members included for shipping purposes, have been removed."

Switches are shipped closed to avoid shipping damage. Open switches in accordance with outlined instructions.

Before any installation work is done, consult and study all drawings furnished by Powercon. These drawings include arrangement drawings, wiring and elementary diagrams and a summary of material.

Frequently, additional shipping members are installed in the bus and primary area to insure against shipping damage. It is imperative that all shipping members are removed, joints are properly tightened and insulated before energizing bus.

Mats, screens, railings, etc., which are external to the switchgear, but which may be required to meet any local codes, must be furnished by the purchaser.

Preparation of Floor (Anchoring)

The station floor must be strong enough to prevent sagging due to the weight of the switchgear structure. The impact loading is approximately 1.1 times the static load.

Suitable means must be provided by the purchaser for anchoring the equipment to the floor. It is essential that the floor be level to avoid distortion of the switchgear structure and the equipment be completely aligned prior to the final anchoring. The recommended floor construction is shown in Figure 2. The floor channels must be level and straight with respect to each other. Steel shims

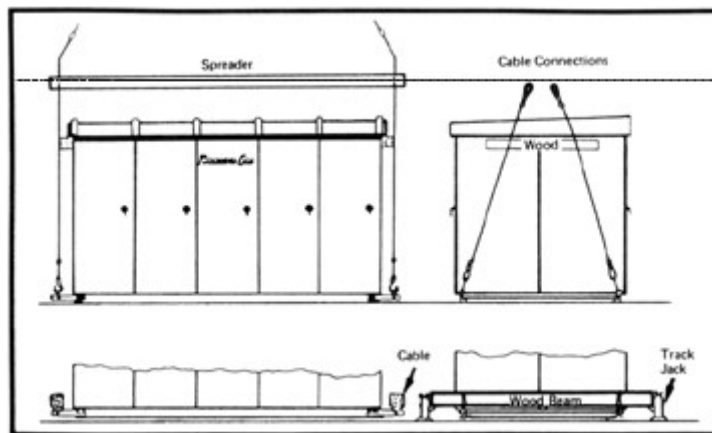


Figure 1. Methods of Handling

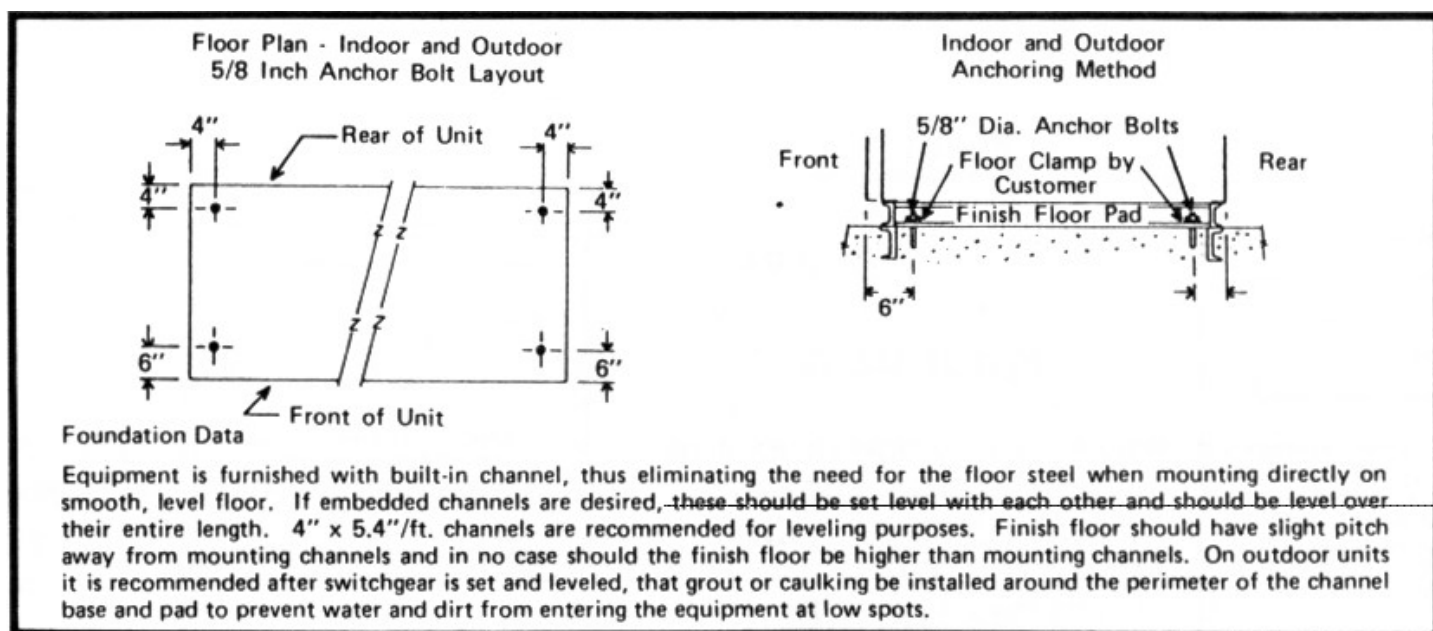


Figure 2. Recommended Floor Construction

should be used for final leveling of the switchgear, if necessary.

Care should be taken to provide a smooth, hard and level floor under and in front of the units to facilitate installation. If the floor is not level and flush with the floor channels, it will be difficult to align the equipment and open the doors.

On outdoor units the entire base must be caulked with a suitable compound to prevent entrance of moisture conduits must be sealed.

Shipping

Shipping splits are made for the convenience of the installer. They are shown on the drawings and agreed to at the time of drawing approval.

It is the responsibility of the installer to properly align, level and bolt the units together and to the concrete floor, and to properly install the interconnection bus and any interconnection secondary control, instrumentation, heaters, wiring, etc.. All materials for interconnections including hardware, bus, insulation and internal secondary wiring are provided by Powercon. All interconnections should be installed in accordance with drawings and wiring diagrams furnished with the equipment.

Interlocks

ANSI C37.20.3 8.5 Interlocks

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

"Interlocks should be checked for proper operation before is applied to the switchgear. Check the access interlock to be sure (1) that access to the power fuses cannot be obtained unless the interrupter switch is open, and (2) that the interrupter switch cannot be closed while the power fuses accessible. In order to maintain the integrity of key interlock systems, duplicate keys should be destroyed or retained in a place accessible only to authorized personnel."

WARNING IMPORTANT

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WARNING

INTERLOCKS ARE PROVIDED ON THIS EQUIPMENT

WHEN KEY INTERLOCKS ARE FURNISHED, OFTEN DUPLICATE KEYS ARE AVAILABLE. THESE ARE FOR INSTALLATION ONLY. DUPLICATE KEYS MUST BE DESTROYED OR RETAINED IN A PLACE ACCESSIBLE TO AUTHORIZED PERSONNEL ONLY, BEFORE ANY PART OF THE EQUIPMENT IS ENERGIZED. FAILURE TO DO SO OR DEFEATING ANY PART OF THE KEY INTERLOCK SCHEME, CAN PROVIDE ACCESS TO THE EQUIPMENT OR PERMIT OPERATING ERRORS, WHICH CAN RESULT IN PROPERTY DAMAGE, WHICH CAN RESULT IN PROPERTY DAMAGE, INJURY OR DEATH.

Prior to operation, refer to sections entitled OPERATION and MAINTENANCE of this manual. In addition, consult drawings for proper operating sequence.

All Powercon Interrupter Switchgear is equipped with a mechanical device that deters access to a closed switch with its doors open.

Heaters

(Standard in Outdoor Equipment Only)

By maintaining a slight temperature differential, the heaters help facilitate drying and prevent condensation and the resulting corrosion and insulation deterioration which might occur.

For heaters as supplied in the switchgear either external or internal, sources of power must be supplied. With either source care must be taken to make sure of energizing prior to the equipment being subjected to moisture. In all cases, the supply must be adequate to feed the entire heater load.

CAUTION

SUPPLYING EXTERNAL SOURCES OF CONTROL POWER TO THIS SWITCHGEAR MAY CAUSE BACKFEED TO THE HIGH VOLTAGE BUS THROUGH CONTROL POWER OR POTENTIAL TRANSFORMERS. CARE MUST BE TAKEN BY DISCONNECTING THE BACKFEED TRANSFORMERS AND SAFELY GROUNDING THE PRIMARIES BEFORE ENERGIZING THE AUXILIARY POWER. REMOVE ALL GROUNDS PRIOR TO ENERGIZING THIS EQUIPMENT.

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

Connections

ANSI C37.20.3 8.2.6.1 Bus Connections

"When the Metal Enclosed Interrupter Switchgear consists of several shipping sections, the main bus is necessarily disconnected before shipping. The main bus should be reconnected with particular attention to the cleanliness of and pressure between the contact surfaces. It is essential that the connections be securely bolted because the conductivity of the joints is dependent on the applied pressure. Refer to manufacturer's torque instructions and any other special instructions." (Reference Table 2)

ANSI C37.20.3 8.2.6.2 Cable Connections

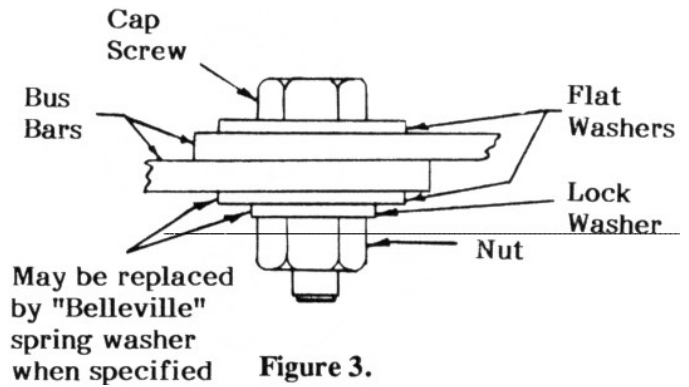
"Before making up the cable connections, the phasing of each cable should be determined in accordance with the connection diagram, and the cables tagged accordingly. The cable manufacturer's instructions should be followed when forming cable terminations and during the installation of the cable. It is essential that the connections be clean and securely bolted, since the conductivity of the joints is proportional to the applied pressure. The terminating devices (where required) should be installed pursuant to the terminator manufacturer's instructions."

ANSI C37.20.3 8.2.6.3 Control Connections

"Control wires between shipping sections should be reconnected as marked by the manufacturer. Connections which are to be connected to the terminals in apparatus remote from the switchgear should be carefully checked against the connection diagram. When making connections to terminals, care should be exercised to assure that the connections are properly made."

The main bus bars and other connection bars may be either copper or aluminum. In either case, the connection surfaces will be made of silver surfaced or equivalent. All field assembled joints in primary conductors, regardless of material or method of insulation, should be made as described below:

- (1). Wipe silver clean. Do not use sandpaper or any abrasive on the silvered surface. Avoid handling of cleaned surface as much as possible.
- (2). Join the clean contact surfaces by using the hardware provided (Per Figure 3). Torque valves as listed in Table 2. **This table not applicable to contact mechanism of switches.**
- (3). In some cases external connections are made to metalclad bus by bars. The metalclad bars are normally silver plated. Unplated bars, either copper or aluminum, should not be used to connect to silverplated bars.



Bolt Material	Torque in Foot-Pounds for Bolt Size				
	¼-20	5/16-18	3/8-16	½-13	5/8-11
Steel	5	12	20	50	95
Silicon Bronze	5	10	15	40	55

Table 2. Bolt Tightness for Bus Connections

Main Bus Assembly

For 4.16 KV, 7.2 KV, 13.8 KV and 34.5 KV equipment:

- (1). Remove compartment covers.
- (2). Bolt splice plates and bus bars together, following assembly instructions as given under section **"Connections"**. (Refer to Table 2 and Figure 3).

Insulated Bus Systems

(Where Applicable)

Where insulated bus is provided as optional equipment, the following must be observed. All field assembly primary joints and terminations must be insulated for the operating voltage. There are two methods of insulating joints, boots where applicable, and taped joints for others. A detailed procedure for joint insulation is described under section entitled **"Taped Joints"**.

World Wide Service



Conveniently located on the east coast between Baltimore and Washington, Powercon's facility is only hours away from Philadelphia and New York. In addition to its proximity to the nation's great industrial centers, Powercon reaches international markets through the ports and air terminals of the eastern seaboard.

POWERCON

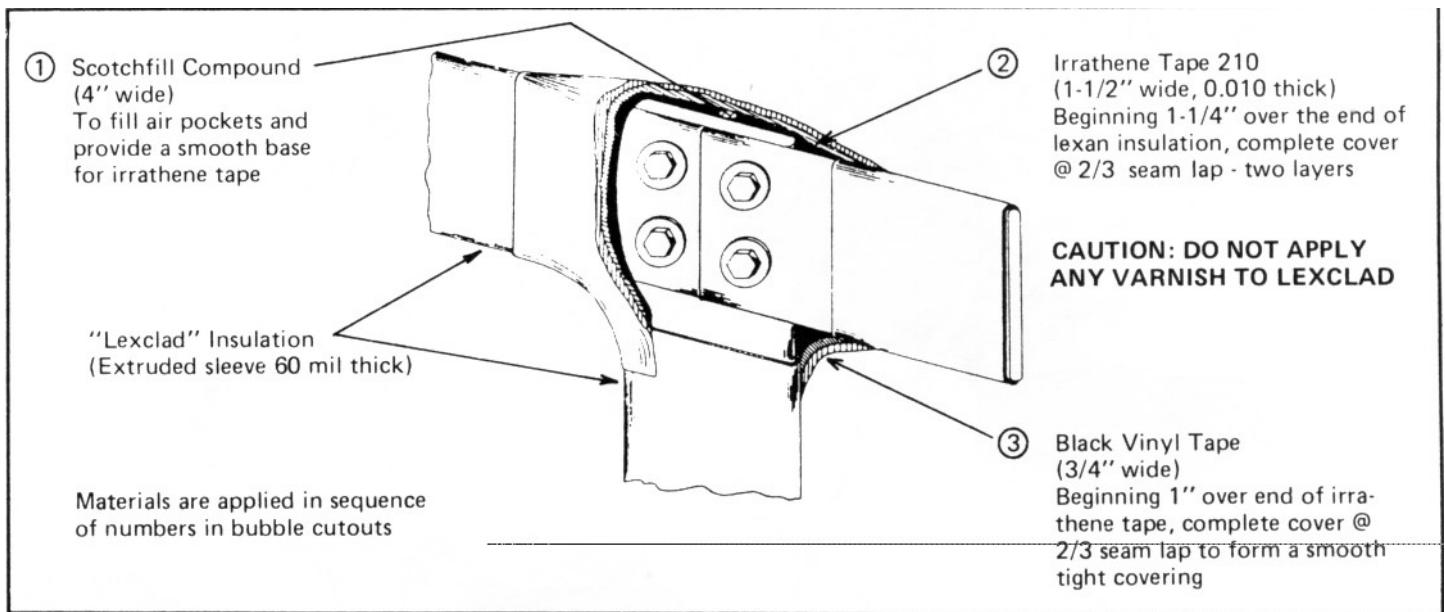
FIELD SERVICE ENGINEERING

Powercon's 24-hour a day field service is provided through factory Field Service Engineers. Our Field Service Engineers are highly skilled SWITCHGEAR experts extremely proficient in providing the highest quality service for switchgear and its components.

Our Service Engineering Group is in close liaison with other Powercon engineers who create the applications, and the mechanical and electrical design of each switchgear equipment. Powercon also maintains detailed records of every part and component manufactured and/or purchased for each project. They have immediate access to the purchasing staff for suppliers service.

Powercon is prepared to provide you with:

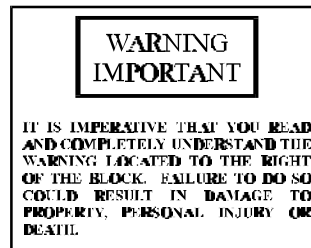
- Emergency Service
- Installation Supervision of New Equipment
- Coordination Check of New Equipment
- Other Required Installation and Engineering Services
- Repair and Maintenance Service for Existing or Obsolete Equipment
- Advice and Instruction of Preventive Maintenance Procedures
- In Warranty Service



Taped Joints

(When Required-See Figure 4)

- (1). Prepare all joints as outlined under section entitled "Connections".
- (2). Fill all cavities around bolts and nuts with a 4" wide filler compound to form a smooth surface for taping, thus preventing air voids. This compound is not an insulating medium and should not be used for this purpose. Cover conductors and hardware with at least 1/8" of filler.
- (3). Apply irrathane tape 210 (1-1/2" wide, 0.0010thick) starting with a minimum of 1-1/4" over the end of the bus bar insulation and completely covering joint at 2/3 seam lap using two layers. Where there are sharp angles apply additional layers to obtain equivalent of the insulation on the flat surfaces.
- (4). Apply a vinyl finish tape (black or red) beginning 1" over the end of the irrathane tape, completely cover at 2/3 seam lap forming a smooth tight covering.
- (5). Mask off bus bar insulation and brush a heavy coat of brown varnish over the final taping. Varnish may be thinned with Xylene.
- (6). Replace all covers previously removed to gain access.



CAUTION

BEFORE REPLACING COVERS, CAREFULLY INSPECT BUS WORK AND PHASE BARRIERS TO INSURE THAT NO TOOLS OR OTHER OBJECTS ARE ACCIDENTALLY LEFT INSIDE THE UNIT.

Cleaning Bus Insulation

Insulated main bus bars, when supplied, are insulated with a high temperature thermoplastic material having excellent dielectric and mechanical properties.

When cleaning is necessary only soap and water or isopropyl alcohol should be used to remove any foreign material from the insulation surfaces.

Primary Cables

(By Customer)

Cable termination space is normally provided in the cubicle for the top or bottom entry as shown on the drawings. Adequate electrical clearance must be maintained between cables, energized parts and grounded

metal parts. It is also the installer's responsibility to adequately support cables such that insulators or bus bars do not carry the strain of the cables.

Before any primary cable connections are made, the cables should be identified to indicate their phase relationship with the switchgear connections. This is necessary to insure that motors will rotate in the proper direction and that the phase rotation is the same when interconnecting two different sources of power.

Non-shielded portions of cable must be fully insulated from ground and any associated devices such as window CT's. Refer to proper cable and/or termination manufacturer's instructions to make this installation.

Lightning Protection

It will be the responsibility of the purchaser to provide suitable lightning arrestors to protect the switchgear from damage due to lightning.

Door Alignment

If for any reason it becomes necessary to realign the doors of the switchgear during installation, follow the procedures given in the following paragraphs.

After checking that the switchgear is level and plumb as described previously under section entitled "**Preparation of Floor (Anchoring)**", start at either end of the switchgear line-up and realign each door individually as required.

The top of each door should be level with the adjacent doors and the space between adjacent doors equalized to permit their free swing. Doors should present an overall neat appearance. The door stops should be adjusted to permit a door swing of approximately 105 degrees.

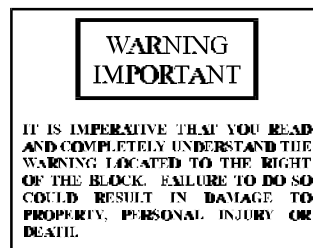
Doors may be raised or lowered vertically, or moved left or right horizontally by loosening the hinge mounting nuts and shifting the hinge and door assembly as allowed by the slotted holes in the hinge.

Doors may be shifted to the forward or backward by adding or removing the washers or shims from between the hinge and the side sheets.

When properly aligned, the doors of outdoor switchgear should be tightly sealed on the gasket all around. After aligning such doors, close and latch the door and check the seal with a 3" x 5" card, shipping tag, IBM card or similar card, around the edge of the door. If the card will pass between the door and gasket, the door is improperly adjusted and should be re-adjusted until the card will no longer pass through.

Fuses

CAUTION



Fuses when supplied by Powercon are not installed when shipped. They must be installed in the final installation. The installer must verify that all fuses, holders, etc. are securely placed in their stationary live parts and where latching or locking accommodations are provided, that fuses are latched and/or locked in place. It is the responsibility of the installer to properly install fuses, holders, fittings, etc. Fusing must not be done on energized equipment.

See "**MAINTENANCE**" section for re-fusing instructions. Since there is such a wide variety of fuses available, refer to proper fuse instruction book for detailed assembly and installation instructions.

Ground Bus

The ground bus is bolted to the frame near the bottom. It is arranged so that connectors to the station ground can be made in any unit. Where the equipment is shipped in more than one group, the sections of the ground bus must be connected by using splice plates furnished with the equipment. Assemble joints as outlined under "**Connections**". Ground bus connections are made in the lower portion of the cable entrance compartment. The switchgear ground bus must be connected to the station ground bus by a conductor having a current carrying capacity equal to that of the switchgear ground bus. It is very important that the equipment be adequately grounded to protect the operator from injury when short circuits or other abnormal occurrences take place and to insure that all parts of the equipment, other than live parts, are at grounded potential.

PRE-OPERATIONAL INSPECTION AND TESTING

(See Check List on Back Cover)

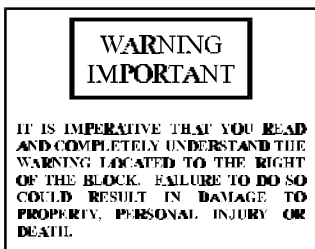
ANSI C37.20.2 8.3 Pre-Operational Check

"Care must be exercised to prevent the Metal Enclosed Interrupter Switchgear from being energized from the power system while preliminary tests are being conducted. If disconnecting means are not available, line leads should be disconnected. All internal connections should be examined to insure that they have not been loosened or damaged during shipment or installation and all bolted connections and joints should be tightened in accordance with manufacturer's instructions. All wiring connections should be checked for tightness, including those at instrument transformers and all terminal blocks. Remove current transformer shorting devices on all active circuits. It is recommended that the integrity of control buses be checked with an ohm meter to insure against short circuits in the control wiring. Control wiring should be given a high potential test or be insulation resistance tested. Power circuits, such as buses and interrupter switches, should receive a low frequency withstand test as described in sections 5.1 and 5.5. After the Metal Enclosed Interrupter Switchgear has been installed and all interconnection completed, any control schemes should be operationally tested and power connections given a final check for phase rotation/sequence before the switchgear is finally energized for service."

CAUTION

**INSTRUCTIONS AND
SAFETY
PRECAUTIONS LISTED
THROUGHOUT THIS
PUBLICATION MUST
BE STRICTLY
OBSERVED.**

**OPERATE AT LEAST 15
OPEN/CLOSE
OPERATIONS AND
OBSERVE PROPER
PERFORMANCE PRIOR
TO ENERGIZATION**



After the equipment has been installed and all connections made, it should be tested and inspected before being put

in service. Check area for foreign materials, tools, etc. that may have been placed on or near high voltage parts. Vacuum floors free of debris, wipe and clean down all barriers, bus insulators, bushings, switches, etc. with a denatured or isopropyl alcohol. Wipe with a clean dry cloth. Although the equipment and devices have been completely tested at the factory, a final field test should be made to be sure that the equipment has been properly installed and that all connections are correct and have not become loosened in transportation.

THE PRIMARY EQUIPMENT SHOULD BE COMPLETELY DE-ENERGIZED WHILE THE TESTS ARE IN PROGRESS

Directions for testing devices such as relays, and meters are given in the manufacturer's instruction book furnished for each device. Special instruction books are furnished for complicated automatic equipments describing operating sequences for each.

When transformers are furnished to supply the control power, the primary taps should be selected so that the control voltage indicated on the wiring diagram is obtained on the secondary of the transformer. When a battery is used to supply the control power, the cables from the battery to the switchgear should be large enough to avoid excessive voltage drop.

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 IEEE factory test voltages.

Potential, current, and control power transformers must be disconnected during high voltage tests.

OPERATION

Description

The powerful opening and closing springs of Powercon's off-center stored energy mechanism provides for quick make (rated fault closing) and quick break (rated load interruption). The switch mechanism shaft is driven by a chain and sprocket from the front operating handle. As the handle is rotated, it is directly connected to a sprocket which in turn chain drives the opening spring to a "charged" position. As the operator continues to rotate the handle, the charged spring is driven off-center by the

chain and releases its energy into rotating the operating shaft to open. The switch blades will not move, in either a closing or opening direction, until the closing spring causes rotation in the operating shaft. It should be noted that once the springs are moved off-center, the operator has no further control of the opening and closing operation. He therefore has a fault closing and rated load break feature independent of his performance.

SEQUENCE OF OPERATION

(Quick Make-Rated Fault Close) (Quick Break-Rated Load Interruption)

To Open the Switch:

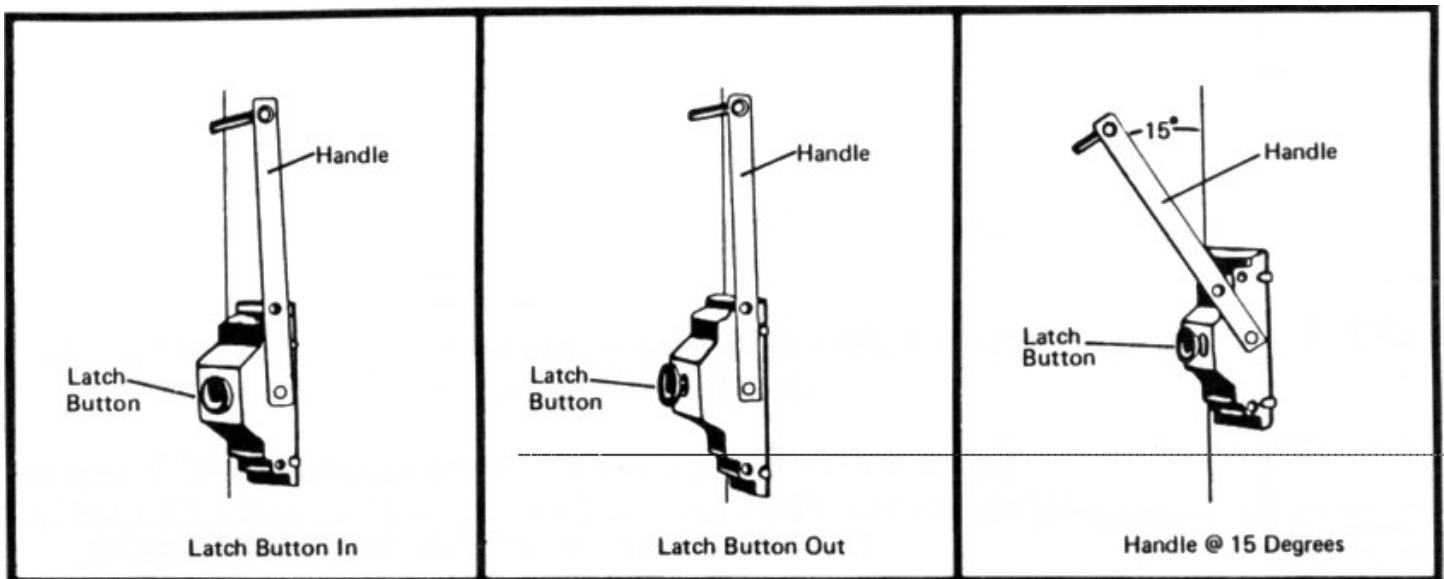
- (1). Pull handle latch button to its extreme position. **(CAUTION: Failure to clear latch button lever from the housing mechanism can cause extreme**

damage and jam the operating mechanism).

- (2). Move handle toward the lower position about 15 degrees or until a resistive force is felt in the handle. It is now safe to release the latch button.
- (3). With a swift positive unhesitating force complete the opening stroke. Once again "off-center" the stored energy mechanism takes over and there is no @further control of the opening by the operator.
- (4). Now complete the movement of the operating handle until you feel and/or hear the latch button seat itself.
- (5). Visually inspect position and condition of switch blades through the inspection window after each operation.

To Close the Switch:

Closing procedures are just the reverse of the above, except of course, move the handle toward the upper position.



MAINTENANCE

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

CAUTION

Before any checking or maintenance of the switchgear after it has been installed, the following must be observed.- Only qualified persons may operate, inspect or maintain power switchgear. In addition to personnel, you may have that are qualified, others may be available from an experienced High-Voltage contractor or the utility servicing the installation. It is the responsibility of the purchaser, installer, or ultimate user to insure that the warning voltage signs are not removed. Make sure all access doors and opening handles are securely locked when the gear is left unattended by qualified people even momentarily

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

DANGER

HAZARDOUS VOLTAGE

DO NOT REMOVE COVERS OR OPEN DOORS OR WORK ON EQUIPMENT UNLESS POWER HAS BEEN TURNED OFF AND ALL CIRCUITS-ENERGIZED AND DISCONNECTED DISCONNECT, DE-ENERGIZE, LOCK-OUT AND PROPERLY GROUND CIRCUITS(S) BEFORE WORKING ON THE EQUIPMENT. USE PROPER SAFETY PRECAUTIONS WHEN WORKING ON THIS EQUIPMENT.

WARNING IMPORTANT

IT IS IMPERATIVE THAT YOU READ AND COMPLETELY UNDERSTAND THE WARNING LOCATED TO THE RIGHT OF THE BLOCK. FAILURE TO DO SO COULD RESULT IN DAMAGE TO PROPERTY, PERSONAL INJURY OR DEATH.

CAUTION

CONSIDER THIS EQUIPMENT ALIVE UNTIL ALL SOURCES OF VOLTAGE ARE REMOVED AND SAFELY GROUNDED

MAKE A LIST OF ALL TOOLS, WIPE CLOTHS, ETC. USED IN THE MAINTENANCE PROCESS. AFTER WORK IS COMPLETE CHECK TO MAKE SURE NOTHING IS LEFT IN THE SWITCHGEAR

TRAINING

ORDER TRAINING TAPES TP002, PARTS 1, 2, AND 3 FOR SAFETY, OPERATION, AND MAINTENANCE

Disconnect, and remove this switchgear from all sources of electric power, so that it is COMPLETELY de-energized prior to working on it. This includes but is not limited to:

- I. The switchgear supply source of electricity.
2. Back feed of electricity from:
 - a. Motors
 - b. Generators
 - c. Power transformers
 - d. Potential transformers
 - e. Control power transformers
 - f. Other sources of electrical power
 - g. Outgoing and/or incoming distribution system
 - h. Paralleled sources

FOLLOW SEQUENCE OF OPERATION OF THE PRECEDING PAGE BEFORE DOING ANY OF THE FOLLOWING:

1. Periodic Checking

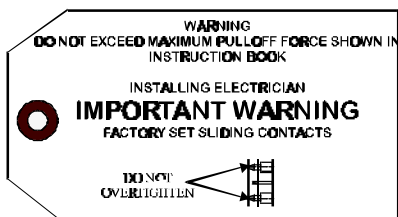
Load break switches should be examined and checked once a year or sooner when conditions require it (such as numerous operations, polluted atmosphere or overloading of the switch). All switches should occasionally be opened and closed several times in succession, not exceeding their rated duty.

2. Cleaning

All switches, including insulators and operating arms should be thoroughly cleaned periodically by wiping with a clean cloth to prevent accumulations of dust. After cleaning, a light coat of lubricant (non-corrosive, high-temperature grease) should be applied to the contact surfaces. Do not use "cup" or other grease which may harden upon exposure to air.

3. Contacts

Check to determine that the blades make good contact. **IMPORTANT. THIS ISA SLIDING JOINT. Over tightening can cause the switch not to open and also cause severe damage to the mechanism.** A contact resistance reading between line and load terminal pads should be taken and should be taken and should be between 35 to 80 micro-ohms. If values are less than 35 micro-ohms, insure that the blades can be "opened" from jaw casting with a pulling force of approximately 30-35 pounds measured at a point between the main blades just below the jaw contact.



Switches are provided with silver to silver contacts. These contacts do not tarnish like copper, but they should be "wiped" clean occasionally, especially if the switch has not been operated for some time. This

can be done by opening and closing the switch several times in succession. **DO NOT ATTEMPT TO GRIND THE BLADES WITH POWERED EMERY OR OTHER ABRASIVES.** Such practice inevitably results in poor contact and overheating.

See "**INSTALLATION**" for aligning and make proper contact.

4. Insulators and Barriers

It is necessary that insulator surfaces be kept clean. This is absolutely essential, particularly when the switches are located where cement dust, metallic dust, salt spray, acid fumes and other unfavorable environmental conditions exist. Alcohol cleaner or a light detergent is recommended for cleaning the porcelain insulators.

5. Insulation Check

When making an annual check, all insulation should be carefully examined for tracking. Special attention must be given to areas where the conductor passes through an insulator or lays near a barrier. Examine the surface for cracks or streaked discoloration. When tracking is found the insulation involved must be replaced.

6. Bus and Conductor (Switch Blade) Check

Inspect the bus and connections carefully every year for evidence of overheating. It is desirable to measure the resistance to ground with a meter (or use a megger of proper voltage) and between phases of the insulation of bus and connections. A record should be kept of this reading. Weakening of the insulation from one maintenance period to the next period can be recognized from the recorded readings. At recording time, the record should include the temperature, the humidity, and the date.

7. Chain Drive

The chain drive assembly connects the stored energy mechanism to the operating handle on the front of the housing. It consists of a length of roller type chain fastened in a loop by two turnbuckles with locking nuts. All chain assemblies are factory adjusted.

8. Operating Shaft

The operating shaft connects the stored energy mechanism to the switch operating arms. The shaft

is integral with the switch assembly and is bearing mounted. Light lubricant applied to bearing surfaces will insure trouble free operation. No adjustments are necessary.

9. Pushrods

Each main blade of the switch is connected to the throw arms or the main operating shaft by an insulating pushrod. These rods should be examined during each normal maintenance procedure for signs of damage to either end of the pushrods. If a damaged pushrod is encountered, replacement parts may be obtained by referring to the "Ordering of Spare Parts" section of this manual.

10. Stored Energy Mechanism

The stored energy mechanism consists of a housing with a one piece crank sprocket assembly supported by bearings and a spring assembly.

The sprocket assembly is chain driven by means of a handle on the front of the housing. As the handle is moved upward, the spring assembly is charged. As the crank sprocket assembly passes over dead center, the spring takes over and instantaneously moves the switch to the closed position. The unit is factory adjusted and should need no adjustment in the field. The only moving parts which should be checked after approximately 100 operations are the front and rear latches, which are spring operated, and the (2) shaft bearings. Check to make sure the latches rotate freely up and down by using finger pressure on the rollers.

11. Lubrication

The load break interrupter switch requires infrequent lubrication, Bearing points and sliding surfaces should be lubricated at the regular inspection periods with a thin film of lubricant. Before lubrication, remove any hardened grease and dirt from latch and bearing surfaces with kerosene. All lubrication should be done with low temperature grease. Mobile SHC 32 Product Doe 640214 is recommended.

12. High Potential Tests

High potential tests to check the integrity of the insulation are not necessary if the insulation maintenance instructions in this book are carefully followed. Should the purchaser desire to make high potential tests, the test voltage should not exceed 14 KVAC for 4.16 kV, 27 KVAC for 13.8 kV and 60 KVAC for 34.5 kV equipments. These voltages are 75% of factory test voltages and are in accordance with ANSI standards.

13. Bus Section

- a. Remove covers. Check buses and connections for evidence of overheating or weakening of the insulation.
- b. Check that all bus mounting bolts and splice connection bolts are tight and torque if required.
- c. After cleaning, megger and record the resistance to ground and between phases of the insulation of buses and connections. Since definite limits cannot be given for satisfactory insulation resistance values, a record should be kept of the reading. Weakening of the insulation from one maintenance period to the next can be recognized from the recorded readings. The reading should be taken under similar conditions each time and the record should include temperature and humidity.

14. Cable and Bus Duct Terminals

Inspect all main cable connections for signs of overheating and when possible check that connections are tight and torque if required.

15. Overall Switchgear

- a. Check that all secondary control wiring connections are tight. Check continuity.
- b. Check to see that all anchor bolts and bolts in the structure are tight.
- c. If the switchgear is equipped with heaters, check to see that all heaters are energized and operating.
- d. Check the ground bus connection and mounting bolts for tightness. Clean the ground bus.
- e. Clean and inspect all painted surfaces. Retouch where necessary.
- f. Check for strange items such as tools, loose nuts and bolts, etc. that are not normally part of the equipment.
- g. Indications of moisture:
 - (1) Staining
 - (2) Tracking over insulators
 - (3) Rust
 - (4) Paint crazing or bubbles

- h. Indications of partial discharge (corona):
 - (1) Ozone odors
 - (2) Tracking of bus supports and insulators
 - (3) Crackling or sparking noises
 - (4) Components glowing in the dark
- i. Check for cleanliness
- j. Check for indications of overheating:
 - (1) Cracked or crazed insulation
 - (2) Discolored bus insulation, paint, etc.
- k. Check caulking of bottom (See Page 5)

- 4. **Always assume both sets of terminals are energized unless proved otherwise by both visual evidence of open circuit and by grounding.**
- 5. **Always have appropriate tools and equipment available.**

Preparatory Procedures

Open the switch associated with the affected fuse(s). Then open the switchgear door to gain access to the fuses. Check backfeed - See Page 14. For actual re-fusing, see applicable instruction for fuses and manufacturers recommended practices and procedures.

RE-FUSING

Precautions

See "MAINTENANCE", Page 14.

RE-FUSING OF High-Voltage SWITCHGEAR SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONS, OBSERVING THE FOLLOWING PRECAUTIONS. THESE RECOMMENDATIONS MAY DIFFER FROM STANDARD OPERATING PROCEDURES AND SAFETY PRACTICES OR CERTAIN ELECTRIC UTILITY COMPANIES. WHERE SUCH DISCREPANCY EXISTS, THE ELECTRIC UTILITIES SHOULD FOLLOW THEIR OPERATING PROCEDURES.

- 1. **Adhere to prescribed safety rules at all times.**
- 2. **Wear approved and periodically tested rubber gloves, hard hat, safety glasses and flash clothing.**
- 3. **Perform operations only in the presence of other qualified persons.**

PAINT TOUCH-UP

(If further information is required - refer to the Powercon Corporation.)

- A. Sand marred or scraped area with fine sandpaper (No. 400).
- B. Make certain area is clean and free of grease or oil.
- C. Apply two coats of all purpose primer with a flat brush or small spray gun.
- D. Feather paint into unmarred portion with light strokes of the brush or light passes with the spray gun.
- E. When primer has dried, apply two coats of finish paint in the same manner.
- F. Small narrow scratches may be best covered by using an artist's brush to filln the scratched area.
- G. If time allows, give the primer additional drying time and sand between coats.

ORDERING SPARE PARTS

The following table is provided as a reference guide to stocking levels of spare parts to minimize downtime when used with a conscientiously applied maintenance program.

RECOMMENDED STOCK FOR FIVE 3-POLE SWITCHES		
Catalog Number	Name of Part	Quantity
S-4449-27	Arc Chute Assembly, 5kV and 15kV	3
B-1459	Arc Chute Assembly, 34.5kV	3
S-4449-18	Quick Break Auxiliary Blade, 5kV and 15kV	3
A-29715	Quick Break Auxiliary Blade, 34.5kV	3
S-4449-22	Hinge Casting (600A), 5kV and 15kV	None
S-4107-22	Hinge Casting, 34.5kV	None
S-4449-21, 21A	Jaw Casting, 4kV and 15kV	None
S-4107-23	Jaw Casting, 34.5kV	None
S-22867, 22868	Main Blades, 600A, 5kV and 15kV	6 (3 Each)
S-22869, 22870	Main Blades, 1200A, 5kV and 15kV	6 (3 Each)
B-1460	Main Blade Assembly, 34.5kV	6 (3 Each)
S-4449-42	Front Connected Insulator, A20, 15kV	4
S-4449-43	Front Connected Insulator, A20, 5kV	4
S-4107-1	Porcelain Insulator, B40, 34.5kV	3
Shop Order No.	Barrier, 5kV, 15kV, and 34.5kV	1 Set (4)
Shop Order No.	Barrier Spacer, 5kV, 15kV, and 34.5kV	1 Set (4)
S-4440-37, 39	Insulating Link Assembly (Pushrods), 5kV and 15kV	1 Set (3)
A-29726	Insulating Link Assembly (Pushrods), 34.5kV	1 Set (3)

TROUBLE SHOOTING (OVERHEATING)

The following table show remedies for correcting overheating problems.

TROUBLE SHOOTING CHART		
HIGH VOLTAGE FUSES AND DISCONNECTING SWITCHES		
Trouble	Cause	Remedy
OVERHEATING	Overload	If the switch is overheating because of excess current, one of tow remedies can be adopted: Replace with a switch of rating adequate for the present or future loads, or Rearrange circuits to remove excess load.
	Poor Contact (Contact out of Alignment)	Adjust Contacts
	Connections to Switch not Adequate Current-Carrying Capacity	Increase the capacity of the connections by adding conductors or by replacing with heavier conductors
	Contact Burned or Pitted	Contacts should be dressed and fitted properly.
	Bolts & Nuts of Connections not Tight	Tighten all bolts and nuts. (Too much pressure must not be used in tightening nuts on bolts. Use of too large a wrench may cause excessive pressure that the expansion of the bolts exceeds their elastic limit, leading to more loosening of the connection).
	Located in Too Hot an Ambient. (Such as too close to a boiler, a furnace, or the like).	Relocate in a cooler place or arrange some means of cooling.



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http://www.powerconcorp.com

INSTRUCTION TAPE - VHS
CAT#TP002
METAL ENCLOSED 5kV Thru 38kV
LOAD BREAK INTERRUPTER SWITCHGEAR



To be used in conjunction with Instruction Books:
PCIB-1008B, PCIB-1002

with Instruction Information On:

Receiving Inspection *Testing * Operation * Maintenance*Adjustments

Including:

Partial Safety Practices

Interlocks

Connections

Electric Operators

General Construction

Bolt Torquing

Demonstrations

Slow Motion Demonstration with 1100 Frame/Sec of Switch Operations

Net Price..... **\$375.00**

LOAD BREAK INTERRUPTER SWITCHGEAR CHECK LIST FOR PRE-OPERATIONAL, INSPECTION, TESTING, AND MAINTENANCE

CUSTOMER

SWITCHGEAR IDENTIFICATION

LOCATION OR JOB NAME

APPROVED FOR OPERATION BY

A. SWITCH BLADES AND ARC BLADES

- ⇒ Check arc blade alignments with arc chutes and stationary arcing contacts.
- ⇒ Check arc blade clearance with arc contacts
- ⇒ Inspect switch blade end for silver contacts
- ⇒ Check switch blade alignment with jaw casting contact.
- ⇒ Check switch blade torque at hinge casting contact.
- ⇒ Insure contact grease is on casting contacts.
- ⇒ Check for proper alignment of switch assembly in cubicle.
- ⇒ Check Visually for 15 Operators

B. INSULATORS

- ⇒ Inspect pushrods for defect
- ⇒ Insure cotter pin fasteners are spread apart (when applicable)
- ⇒ Check switch blade alignment with levers on shaft Check length of eye bolt within insulating rod (when applicable) Inspect insulators for defects or dirt
- ⇒ Insure lightning arrestors are mounted securely (when furnished) Check for tightness of nut on insulator rods (when furnished)

C. HANDLE MECHANISM

- ⇒ Check Chain on mechanism for proper tension
- ⇒ Check handle release knob for freedom of movement
- ⇒ Check handle positioning top and bottom of casting
- ⇒ Check handle unit for (3) nameplates
- ⇒ Inspect adjusting rods for proper length within adjusting bolt (when applicable)

D. CABLE AND BUS

- Inspect bolts on bus connections for tightness
- ⇒ Check clearance phase to phase and phase to ground of cable and bus
 - ⇒ Bus and cable supports are adequate
 - ⇒ Inspect cables for penciling at ends
 - ⇒ Inspect cable termination in cable lugs for tightness
 - ⇒ Inspect placement of phase markings
 - ⇒ Check plating on bus bars
 - ⇒ Inspect taped joints for tightness (when applicable)
 - ⇒ Check connections on lugs
 - ⇒ Inspect taped joints for coverage of insulating varnish and heating.



E. KEY INTERLOCKS (When applicable)

- ⇒ Check door block for lubrication
- ⇒ Check key interlock system for proper sequence and operation
- ⇒ Insure interlock is free from binding
- ⇒ Check weathercap fits securely (outdoor only)
- ⇒ Insure key nameplate matches key number
- ⇒ Handle stops on casting do not interfere with interlock mechanism. Remove all spare keys

F. FUSE ACCESSORIES

- ⇒ Check contact of fuses mounted in fuse clip
- ⇒ Inspect unit for spare fuse holder or mounting
- ⇒ Check alignment of fuses with fuse clips

G. SWITCH UNIT - GENERAL

- ⇒ Inspect phase barriers for secure mounting
- ⇒ Check unit for manufacturers and nomenclature nameplates Inspect paint' coverage of unit
- ⇒ Inspect door handles, locking bars and mechanism and lubricate Inspect for damaged, bent or twisted doors
- ⇒ Check unit for proper device markings
- ⇒ Inspect unit for gasketed joints (outdoor only)
- ⇒ Check unit for water tightness, dirt, moisture, rust
- ⇒ Inspect unit for door stop alignment (when applicable)
- ⇒ Inspect unit doors for proper opening
- ⇒ Check louvers for proper back up and clean filters.
- ⇒ Seal all openings to prevent moisture, vermin, rodents, snakes, etc. from entrance to equipment
- ⇒ Check insulator for heat
- ⇒ Check and torque all bolts
- ⇒ Check heaters, thermostats and other environmental controls

H. MEGGER @ _____ VOLTS _____ OHMS _____

I. HI POT (75% of Factory)

J. REMARKS

⇒ _____
⇒ _____
⇒ _____

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