

# Inspection Recommendations

## Table of Contents

<b>Introduction</b> .....	<b>2</b>	<b>Safety Information</b> .....	<b>4</b>
Qualified Persons .....	2	Understanding Safety-Alert Messages .....	4
Read this Instruction Sheet .....	2	Following Safety Instructions.....	4
Retain this Instruction Sheet.....	2	Replacement Instructions and Labels .....	4
Proper Application.....	2	<b>Safety Precautions</b> .....	<b>5</b>
Warranty.....	3	<b>Overview</b> .....	<b>6</b>
Warranty Qualifications .....	3	<b>Inspection Procedures</b> .....	<b>8</b>



# Introduction

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## Qualified Persons

### **WARNING**

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended only for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

## Read this Instruction Sheet

### **NOTICE**

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating manual PMH Pad-Mounted Gear. Become familiar with the Safety Information and Safety Precautions on page 4 and 5. The latest version of this publication is available online in PDF format at <https://www.sandc.com/en/contact-us/product-literature/>.

## Retain this Instruction Sheet

This instruction sheet is a permanent part of the manual PMH Pad-Mounted Gear. Designate a location where users can easily retrieve and refer to this publication.

## Proper Application

### **WARNING**

The equipment in this publication must be selected for a specific application. The application must be within the ratings furnished for the equipment. Ratings for manual PMH Pad-Mounted Gear are listed in the ratings table in Specification Bulletin 662A-31. Ratings for this gear are listed on the ratings label on the interior of the doors (right-hand door only for double door models.)

**Warranty**

The warranty and/or obligations described in S&C's Price Sheet 150, "Standard Conditions of Sale—Immediate Purchasers in the United States," (or Price Sheet 153, "Standard Conditions of Sale—Immediate Purchasers Outside the United States"), plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (OR PRICE SHEET 153)

**Warranty  
Qualifications**

The standard warranty contained in the seller's standard conditions of sale (as set forth in Price Sheet 150) does not apply to manual PMH Pad-Mounted Gear where fuse units, fuse unit end-fittings, holders, refill units, or switch blades of other than S&C manufacture are used in conjunction with S&C SML Mountings. Nor does it apply to manual PMH Pad-Mounted Gear where other than Fault® Fiter Electronic Power Fuses, S&C Switch Blades, or the current-limiting fuses listed in Table 1 of S&C Information Bulletin 660-50 are used in conjunction with Fault Fiter Electronic Power Fuse mountings and S&C Holders designed therefor, or when current-limiting fuses are applied other than as set forth in the "Recommended Voltage Ratings" section of S&C Information Bulletin 660-50.

# Safety Information

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## Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the product. Become familiar with these types of messages and the importance of these various signal words:

### **DANGER**

“DANGER” identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.

### **WARNING**

“WARNING” identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

### **CAUTION**

“CAUTION” identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

### **NOTICE**

“NOTICE” identifies important procedures or requirements that can result in product or property damage if instructions are not followed.

## Following Safety Instructions

If any portion of this instruction sheet is unclear and assistance is needed, contact the nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C’s website [sandc.com](http://sandc.com), or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

### **NOTICE**

Read this instruction sheet thoroughly and carefully before installing manual PMH Pad-Mounted Gear.



## Replacement Instructions and Labels

If additional copies of this instruction sheet are required, contact the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

**⚠ DANGER**



**S&C Manual PMH Pad-Mounted Gear operates at high voltage. Failure to observe the precautions below will result in serious personal injury or death.**

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to manual PMH Pad-Mounted Gear must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules. Always maintain proper clearance from energized components.
3. **DOORS.** High-voltage compartment doors must be securely closed and latched, with padlocks in place at all time unless work is being performed inside the enclosure. Mini-Rupter® Switches have switch operating-shaft access covers located on the sides of the pad-mounted gear enclosure. They must be closed and padlocked at all times unless the switches are being operated.
4. **KEY INTERLOCKS.** Optional key interlocks, if furnished, must be in place. Check the operating sequence of the key interlocks to verify proper sequencing. After the pad-mounted gear is installed, destroy all duplicate keys or make them accessible only to authorized persons so the key-interlock scheme will not be comprised. Key interlocks are not security locks and are not substitutes for padlocks.
5. **OPENING DOORS.** Do not apply any undue force when attempting to open a door. The use of undue force may damage the door-latching mechanism. If optional key interlocks are provided, make sure the interlocks are in their correct positions to allow door opening.
6. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
7. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules, especially when handling fuses and barriers within high-voltage compartments.
8. **GROUNDING.** The manual PMH Pad-Mounted Gear enclosure must be connected to a suitable earth ground before energizing and at all times when energized.
9. **FUSES.** Make sure fuses are disconnected from all power sources (including backfeed) before being inspected or replaced.
10. **MINI-RUPTER SWITCHES.** Always confirm the **Open/Close** position of Mini-Rupter Switches by visually observing the position of the switch blades.
11. **ENERGIZED COMPONENTS.** Always assume both terminals of any switch or fuse are energized unless proved otherwise by test, by visual evidence of open-circuit conditions on both terminals, or by observing both terminals are grounded.

S&C recommends inspecting S&C Manual PMH Pad-Mounted Gear six months to a year after installation and then every five years thereafter to ensure continued proper gear performance. Each user's own experience and environmental conditions at the installation site will determine whether more or less frequent inspections are required.

A partial visual inspection of the gear for general cleanliness and to confirm proper cable-termination alignments and conditions may be performed with the gear energized if permitted by the user's own operating practices and provided that standard precautionary practices are followed. Such visual inspections may be performed when the gear is visited for other reasons as well. However, the more detailed inspection and maintenance procedures outlined in this publication may only be completed when the unit is completely de-energized and grounded.

### **NOTICE**

S&C recommends switchgear be completely de-energized and properly grounded according to the user's operating and safety procedures. It also should be thoroughly cleaned by hand. If it is not possible to de-energize the gear, the use of pressure sprayed dry ice (solid CO<sub>2</sub>) is an acceptable alternative cleaning method. The use of pressure-sprayed abrasives or solvents is specifically not recommended because such abrasives or solvents will damage the switchgear.

If maintenance is required that is beyond the scope of this publication, or if replacement parts are necessary, contact the nearest S&C Sales Office or the Global Support and Monitoring Center at 1-888-762-1100. Have the complete catalog number of the gear and date of shipment (as shown on the nameplate) available for reference.

 **WARNING**

When access to high-voltage compartments is required, it should be restricted to qualified persons who observe the following procedures:

- Adhere to prescribed safety rules at all times.
- Make sure fuses, Mini-Rupter Switches, their mechanisms, and any other devices are disconnected from all power sources and are grounded before that device is inspected, serviced, or repaired.
- Always assume both sets of terminals on any Mini-Rupter Switch or fuse are energized unless proven otherwise by test, by visual evidence of open-circuit conditions on both terminal ends, or by grounding.
- Test for voltage. Qualified persons should know how to operate the correct test equipment for determining the voltage on both sets of terminals on any fuse or interrupter switch.
- After the gear has been completely disconnected from all sources of power and tested, properly connect suitable grounding leads to the incoming and outgoing phases of the equipment to be maintained.
- Install dual-purpose front barriers, if furnished, in the **Slide In** position.● If a contact on either side of a barrier is energized, do not leave the barrier in the **Slide In** position for longer than one week. These barriers are intended for temporary use only to isolate the blades of the switch from the main contacts while work is being performed. If the barriers are left in the **Slide In** position for extended periods, there is the possibility of corona discharge to the barriers. Prolonged exposure to corona discharge may damage the barriers and result in a flashover.

● Dual-purpose front barriers for switches and fuses are optional on units shipped prior to September 1994, after which they became standard.

- When the equipment to be maintained is not of S&C manufacture, follow instructions supplied by the manufacturer of the equipment.
- Make sure the enclosure is properly grounded to the station or facility ground. No equipment should be returned to service unless such grounds are properly made.

When returning the equipment to service, the following procedures should be observed:

- Withdraw any dual-purpose front barriers, if furnished, from the **Slide In** position and return them to their normal, suspended position.
- Make sure fuses (or switch blades instead of fuses) are closed and securely latched.
- Make sure any grounding means are removed before energizing the associated Mini-Rupter Switch or fuse.
- Close each door permitting access to high voltage, and make sure the associated door-latching mechanisms are securely latched before energizing the circuit or operating any switching device.
- Make sure the Mini-Rupter Switches are in the correct **Open** or **Closed** positions as dictated by the electric power system design.
- Padlock all doors before leaving the installation site, even momentarily. Observe this procedure even in those cases where the gear is accessible only to qualified persons.

# Inspection Procedures

## NOTICE

Do not use industrial strength cleaning solutions (e.g., Formula 409®, Simple Green®) or lubricants that contain solvents. Solvent vapors can attack arc compressor components and fuse pull-rings, resulting in reduced interrupting performance or weakened parts. NYE Rheolube 368 (available in small ¼-oz. tubes from S&C) is the only approved lubricant.

**Table 1. Inspection and Maintenance Procedures**<sup>①</sup>

Item	Procedures																			
Inspect and clean interior	<ol style="list-style-type: none"> <li>1. Visually inspect the interior of each compartment for excess dirt, weeds, rodent, reptile, and insect intrusion.</li> <li>2. If cleaning is necessary, S&amp;C recommends using water to wash dirty or contaminated surfaces. Mild soap may be used to remove particularly stubborn deposits on painted surfaces, barriers, and Cyproxy™ Insulator parts.</li> <li>3. Inspect insulators, surge arrestors, terminators, etc., for physical or electrical damage.</li> <li>4. Check that grouting around the base of the unit is in good condition. Verify there has been no major water ingress.</li> </ol>																			
Inspect barriers and minimum air clearances	<ol style="list-style-type: none"> <li>1. Inspect barriers for signs of tracking and corona discharge. Surface deposits can be wiped off. If surface erosion is present, the barriers may need to be replaced.</li> <li>2. Verify interphase and end-barriers hang vertically and retaining hardware securely holds them in place. Be sure the switch-side interphase barriers are properly seated in the support notch (if present) in the lower rear and lower front (25-kV models only) of the compartment.</li> <li>3. Verify the clearance from the terminators and other energized parts to the barriers and electrical ground is maintained to prevent flashover (e.g., fuse silencer to terminator drain wire). Minimum air clearances are listed below: <table border="1" style="margin-left: 20px; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Rating, kV</th> <th colspan="4">Minimum Air Clearances, Inches (mm)</th> </tr> <tr> <th>Energized Parts to Barriers</th> <th>Terminator Skirts to Barriers</th> <th>Energized Parts to Elec. Ground</th> <th>Phase-to-Phase</th> </tr> </thead> <tbody> <tr> <td>14.4</td> <td>1 (25)</td> <td>½ (13)</td> <td>6 (152)</td> <td>6 (152)</td> </tr> <tr> <td>25</td> <td>2¼ (57)</td> <td>1¼ (32)</td> <td>7½ (191)</td> <td>7½ (191)</td> </tr> </tbody> </table> </li> </ol>	Rating, kV	Minimum Air Clearances, Inches (mm)				Energized Parts to Barriers	Terminator Skirts to Barriers	Energized Parts to Elec. Ground	Phase-to-Phase	14.4	1 (25)	½ (13)	6 (152)	6 (152)	25	2¼ (57)	1¼ (32)	7½ (191)	7½ (191)
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Inspect and exercise Mini-Rupter Switches	<ol style="list-style-type: none"> <li>1. Exercise the Mini-Rupter Switches and check all blades for proper opening and closing. Make sure barriers are not in an open gap.</li> <li>2. Inspect, clean, and re-lubricate the Mini-Rupter Switches. <ol style="list-style-type: none"> <li>a. Check blades for signs of galling and excessive arc interruption. Minor surface imperfections can be burnished out. Clean the blades and apply a thin layer of lubricant, as necessary.</li> <li>b. Clean rotating hinge contacts and apply a thin layer of lubricant, as necessary.</li> <li>c. Check contacts and joints for signs of overheating, as evidenced by distorted or discolored metal.●</li> </ol> </li> </ol> <p><b>Note:</b> S&amp;C recommends the cleaning and re-lubrication of Mini-Rupter Switches every 10 years, regardless of condition, to ensure proper operation, or more frequently if the environment is excessively hot, humid, dry, dirty, or contaminated.</p>																			
Inspect fuses	<ol style="list-style-type: none"> <li>1. Open and close fuses to ensure proper latching. Refer to the applicable S&amp;C instruction sheet for fuse-handling instructions.</li> <li>2. Inspect the fuse-contact surfaces for signs of galling and overheating, as evidenced by distorted or discolored contacts.● Minor imperfections can be burnished out. Clean contacts and apply a thin layer of lubricant, as necessary.</li> </ol>																			
Inspect key interlock and door latching mechanisms	<ol style="list-style-type: none"> <li>1. Verify proper functioning of key interlocks, if furnished.</li> <li>2. Verify proper operation of the door-latching mechanisms.</li> </ol>																			
Touch up exterior	<ol style="list-style-type: none"> <li>1. To maintain the original integrity of the finish, clean the exterior of the gear and touch up scratches and abrasions using S&amp;C touch-up finish and red-oxide primer, available in aerosol spray cans. See Table 16 in S&amp;C Specification Bulletin 662A-31 for catalog number information used for ordering.</li> </ol>																			

① If maintenance is required beyond the scope of this publication or if replacement parts are necessary, contact the nearest S&C Sales Office or the Global Support and Monitoring Center. Have the complete catalog number of the gear and date of shipment (as shown on the nameplate) available for reference.

● There may be discoloration of copper or copper-alloy surfaces caused by oxidation. This, however, does not indicate overheating.