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TYPE PLD PAD-MOUNTED SWITCHGEAR 15kV • 25kV INSTRUCTIONS For Installation and Operation



The Type PLD Pad-mounted Switchgear includes load-interrupter switches with terminal pads accommodating conventional terminators for a live-front interface and 200 ampere fusing with bushing wells accommodating 200 ampere load-break elbows for a dead-front interface. All units use the same fully tested and field proven switch designs.

Qualified Persons

⚠ WARNING

The equipment covered by this publication must be selected for a specific application and it must be operated and maintained by **Qualified Persons** who are thoroughly trained and knowledgeable in the installation, operation, and maintenance of underground power distribution equipment along with the associated hazards that may be involved. This publication is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment. Proper installation is the responsibility of the operating and construction personnel and the utility performing and authorizing the work. Completion of these instructions implies no further warranty by the manufacturer.

A **Qualified Person** is defined in the National Electrical Code (NEC/NFPA-70) as:

One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

The specific electrical safety training requirements to be considered a qualified person are detailed in **NFPA-70E, Article 110.1(D), Employee Training**. Some of the requirements from the 2012 edition are shown below. For the specific detailed training requirements for a Qualified Person make certain to refer to the most recent applicable edition.

These training requirements would include, but are not limited, to the following key points:

- The skills and techniques necessary to distinguish exposed energized parts from other 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 the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.
- Tasks performed less often than once per year have additional training requirements.

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. Additionally, the recommendations in this instruction bulletin are not intended to supersede or to take the place of established utility safety guidelines and established practices. If there is any question, consult with your foreman or supervisor, as appropriate.

Please refer to OSHA 29 CFR 1910.399 and NFPA 70E Articles 100 and 110.

SAFETY INFORMATION

Understanding Safety-Alert Messages

There are several types of safety-alert messages which may appear throughout this instruction bulletin as well as on labels attached to the pad-mounted switchgear. Familiarize yourself with these types of messages and the importance of the various signal words, as explained below.

DANGER

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

WARNING

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

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

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

SAFETY INSTRUCTIONS

Safety Instructions (or equivalent) signs indicate specific safety-related instructions or procedures.

SAFETY PRECAUTION

DANGER

Federal Pacific Fuse Mountings in conjunction with appropriate fuses are designed to protect equipment and to disconnect faulted equipment from the system. The fuses cannot protect personnel from injury or electrocution if contact is made with energized circuits or hardware.

FOLLOWING SAFETY INSTRUCTIONS

NOTICE



Thoroughly and carefully read this instruction bulletin before installation of the pad-mounted switchgear, before switching or operating the switches or fuse mountings in this equipment, and before performing any maintenance on the equipment.

If you do not understand any portion of this instruction bulletin and need assistance, contact Federal Pacific at 276-466-8200.

Replacement Instructions & Labels

If you need additional copies of this instruction bulletin, contact Federal Pacific at 276-466-8200.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting Federal Pacific.

Introduction

Type PLD pad-mounted switchgear is designed to make installation, operation and maintenance as simple as possible and to provide dependable on-the-line service.

High quality materials and careful workmanship have been combined to provide the best switchgear available. The switchgear has been thoroughly inspected and adjusted at the factory. However, successful operation depends on proper installation and care.

This manual has been written to assist you in obtaining long and economical service from your switchgear.

Read this manual before installing and operating your switchgear.

Receiving

Upon receipt of the switchgear, check each item received for shipping damage. Each item should be checked against the shipping manifest to assure that the proper number of items were received. Should any shortage or damage exist, a claim must be filed at once with the carrier, and the Federal Pacific agent or sales office must be notified.

Handling

The switchgear is securely mounted to a sturdy shipping pallet with provisions for forklift use in removing the unit from a truck. The forklift truck used must have the proper lifting capacity and the forks must extend completely through the skid to avoid damaging the equipment.

Removable lifting plates are provided to allow the use of hooks to lift the complete enclosure. The lifting sling should be arranged to evenly distribute the lifting force between the lifting plates. See Figure 1.

CAUTION

Do not lift at an angle less than 60° from the horizontal. See Figure 1. Failure to comply with this requirement may result in damage to the equipment.

Storage

The switchgear as received may be wrapped in a protective plastic film.

NOTICE

To avoid damage to the enclosure, the protective film must be removed for outdoor storage of unit.

Export or special packing is available as an option based on customer's requirements and special conditions. Separate instructions are available for these situations.

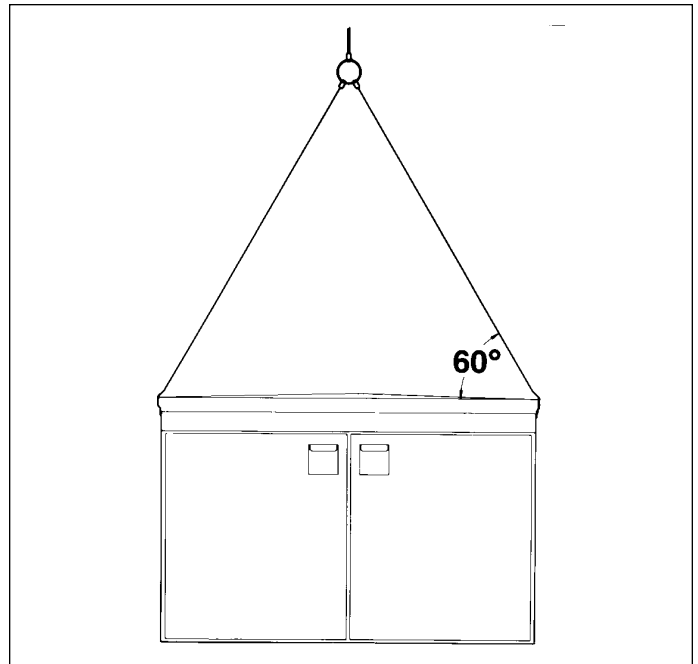


Figure 1. Lifting Method

General Description

Type PLD pad-mounted switchgear typically consists of one or more three-pole, single-throw, gang-operated, quick-make, quick-break, load interrupter switches in combination with one, two or three 3-phase sets of fuses. The terminal pads of the load-interrupter switches accommodate conventional terminators to provide a live-front interface. The terminals of the 200-ampere fuses include 200-ampere bushing wells accommodating 200-ampere load-break elbows to provide a dead-front interface. When used in conjunction with power fuses, expulsion or current-limiting type, and other protective devices, the PLD switchgear provides a safe and efficient means of 3-pole switching and circuit protection.

Security Features

Type PLD pad-mounted switchgear incorporates a number of security features to minimize hazards to operating personnel.

1. Rugged 11-gauge steel, all welded construction of the enclosure, roof, and doors assures a tamper-resistant design.
2. Padlockable switch operating pocket handles and doors with security bolts provide user-controlled access.
3. Switch position indicators positively verify switch position.
4. Provisions to padlock switch in open or closed position permit user controlled switch operation. (Optional)
5. Key interlock to ensure a predetermined sequence of mechanical operations. (Optional)
6. Warning signs and labels, both external and internal (unless otherwise specified), which indicate potential hazards to personnel.

⚠ CAUTION
Do not use power tools to operate the security bolt.

Auto-Latch Door

Active Door (“Auto-Latch Door”)

The type PLD pad-mounted switchgear incorporates an active door, which includes an automatic three-point latching system for enclosure security. The features and operation of the auto-latch active door are discussed below. See Figure 2a.

Passive Door

The passive door is overlapped by the active door, ensuring that the auto-latch mechanism must first be released before accessing the passive door. Once so accessed, the passive door is released by raising the latch bracket from its engaged (latched) position. See Figure 2b.

Features of the Auto-Jet Mechanism on the Active Door

The automatic door latching feature furnished on the active doors provides ease in opening and closing of the doors. Features of the Auto-latch system are:

- Automatic 3-point latching upon door closure (see Figure 2a).
- After opening, the door is automatically set for latching upon door closure.
- Unlatching is only accomplished by an unrestrained rotation (approximately 60° in either direction) of the captive pentahead or hexhead actuator bolt.



Figure 2a. Auto-latch mechanism with 3-point latching on door closure.



Figure 2b. Release passive door by simultaneously pushing on it and raising the latch bracket.

- The door padlocking provision prevents unlatching the mechanism until the padlock has been removed. Padlocking secures the door to the cabinet enclosure.
- A stainless steel protective cover guards the padlock from tampering. Also, access to and visibility of, the actuator bolt is only possible after the padlock has been removed.



Figure 3. Raise cover to access security bolt. Review and understand the “CAUTION” label on the underside of the cover.



Figure 4. Use a manual wrench with pentahead or hexhead socket as applicable. As explained on the caution label, **DO NOT USE POWER TOOLS**. Rotate the security bolt clockwise or counter-clockwise to release three-point latch and charge for subsequent door closing. Do not use power tools to operate the security bolt.

Auto-Latch Door Operation

Opening:

1. Remove padlock and raise protective cover exposing security bolt. See Figure 3.
2. If equipped with the standard pentahead security bolt, use the standard pentahead socket (or if equipped with an optional hexhead bolt, use a 3/4” hexhead socket) to rotate the captive actuator bolt head approximately 60° in either direction until the latching mechanism has tripped, releasing the door. **Do not use power tools to operate the security bolt.** See Figure 4.
3. Open the active door. Open the passive door by simultaneously pushing on it and pulling up on the latch bracket. See Figure 2b. Secure the doors with the doorkeepers.

Closing:

1. Replace or release door keeper and close and secure latch bracket onto passive door. Then, release and replace door keeper and secure the active door by firmly and briskly pushing it closed. Mechanism will automatically latch.
2. Install padlock through protective cover tab and enclosure tab.

Installation

Each unit is shipped with this instruction bulletin which will be located inside the switch compartment door. These instructions should be reviewed prior to placing unit on pad.

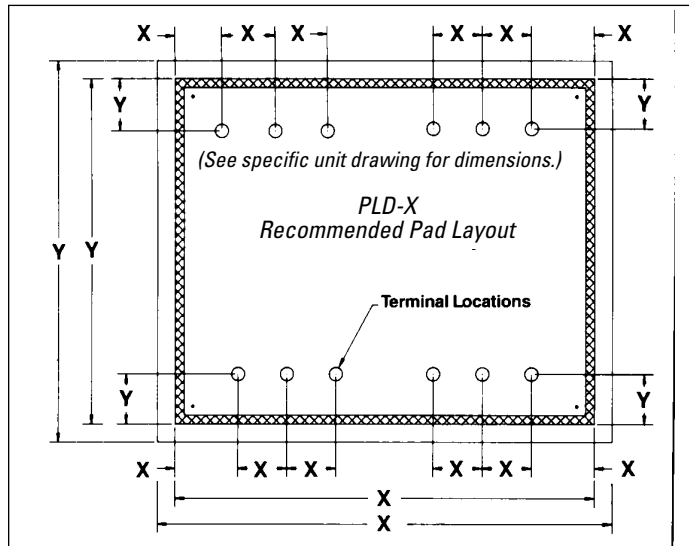


Figure 5. Typical Pad Layout

NOTICE

Installer shall provide appropriate clear working space, as required by applicable codes and/or work practices, to allow installation, operation, inspection, and maintenance of the switchgear.

Placement of Unit

Remove unit from shipping pallet per handling procedures on Page 3 (Figure 1). When unit has been correctly oriented and placed on pad (Figure 5), verify that unit is level and shim if necessary between unit base and pad. Secure unit to pad using four (4) tie-down clips as furnished (see Figures 6 and 7). Check compartment door operation (refer to page 4 for auto-latch door operation) for any binding due to enclosure distortion and re-shim if necessary. A recessed grouting should then be applied between unit base and pad to prevent entry of foreign objects.

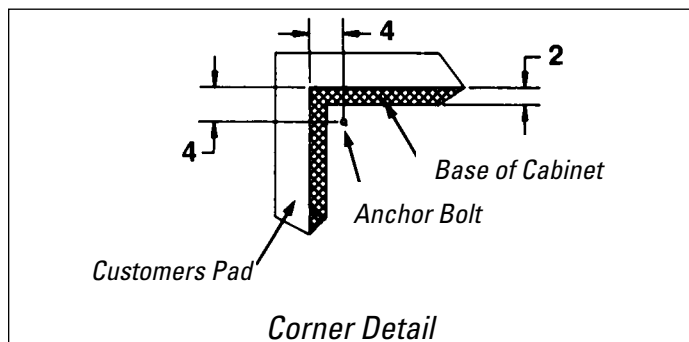


Figure 6. Typical Anchor Bolt Location

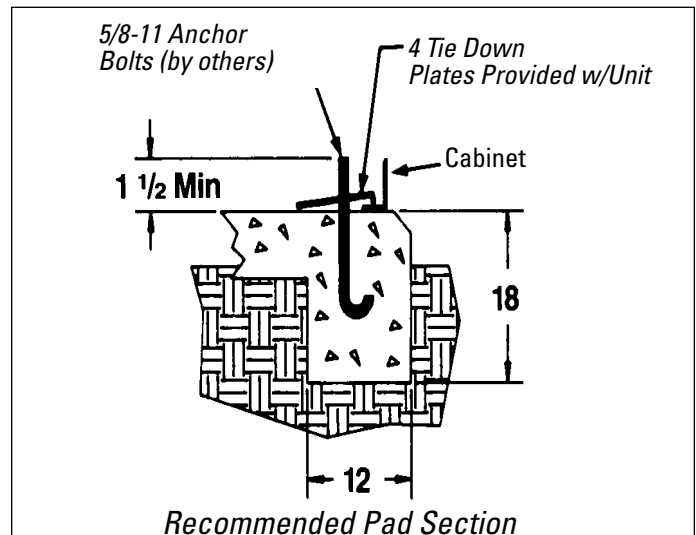


Figure 7. Bolting Units to Pad

Barrier Removal

The use of interphase, phase-to-ground, and dual purpose front barriers for switches enhances the operation of pad-mounted switchgear by field personnel. The standard barrier system for Type PLD pad-mounted switchgear includes removable interphase barriers for switches which maintain all the features of a fixed barrier system while allowing removal of phase-to-phase barriers from the switch compartments during cable termination.

WARNING

When removing barriers, care must be taken to keep the barrier clean and dry. Contamination on barrier can lead to tracking and arcing. Clean off any contamination with a non-alcoholic cleaner that does not leave any residue.

Removal of the switch interphase barriers is readily accomplished as follows:

1. Completely disconnect the unit from all power sources.
2. Open main door (see Door System on page 4) and secure with door keeper.
3. In each switch compartment, remove the dual purpose barriers from their normal hanging position. If the optional B4/B5 barrier is provided, it must be opened before dual purpose barriers may be accessed (see page 6).
4. Before barrier removal is attempted, test for voltage, and ground the unit using the user's standard practice procedures and using grounding clamps suitable for the short-circuit rating of the equipment.
5. Grasp center of interphase barriers. With lifting and pulling up action, remove barriers from switch (see page 6). See Figure 8.
6. Barriers may be reinstalled by grasping the top and center of barrier, placing in front guide slots and inserting barrier through front slots into rear guides.
7. Dual purpose barriers may then be reinstalled.

The optional B4/B5 barrier is provided to meet the requirements of section 381-G of the National Electrical Safety Code. The B4/B5 barrier (if provided) is hinged and is secured closed by pentahead bolts. The hinged barriers can be secured open by inserting the large pin that is cable-connected to the inside of the main compartment door into the bracket located on the top edge of the barrier. Open and secure the hinged barrier as follows:

1. Disengage the security bolt at the side of the B4/B5 barrier. See Figure 9.
2. Swing the barrier open. See Figure 10.
3. Secure the B4/B5 barrier open by inserting the pin into the bracket on the barrier.



Figure 8. Switch-side removable barriers facilitate cable installation and termination. Lift up and pull out to remove barriers.



Figure 9. Disengage barrier security bolt using pentahead socket.

Figure 10. Secure barrier open using pin provided on door.

⚠ WARNING

Failure to observe the electrical clearances specified in the table and illustrated in the diagrams on page 11 may result in electrical arc damage, personal injury or death.

Customer Cable Connections for Switches

With switch removable barriers removed, customer cables may be easily terminated to the switch terminals per the following procedures:

1. The hanging weight of the primary cables must not be allowed to place undue strain on the switch/fuse termination bus. Should this situation exist, cable supports must be used. The mounting holes in the switch/fuse termination bus and the cable connector must align to prevent undue strain.
2. Make up the primary cable connections per user URD operating procedures, cable manufacturer instructions, and cable terminator manufacturer instructions.
3. Remove surface oxides and coat both surfaces with suitable joint compound (required only when unplated aluminum connectors are used).
4. Attach cable connector to the switch termination bus using 1/2-inch hardware as shown in Figure 11. Nominal torque of 45 foot pounds should be applied on metal-to-metal surfaces.
5. Connect the concentric neutral wires and enclosure grounding pads inside enclosure to establish a ground system conforming to user's standard grounding practices.
6. Install and connect surge arresters or fault indicators, if applicable.
7. Install switch barriers. (See section on barrier removal on pages 5 & 6).

Customer Cable Connections for Fuses

1. Make up the primary cable connections per user's standard URD operating procedures, cable manufacturer instructions, and elbow terminator manufacturer instructions.
2. Connect the concentric neutral wires to the enclosure ground pads inside enclosure to facilitate ground system conforming to user's grounding procedures.

⚠ WARNING

The maximum momentary rating of the switchgear must be considered when selecting cable size for connecting switchgear to system ground. Refer to unit rating plate.

3. Install fault indicators, if applicable.

⚠ WARNING

Before energizing the switchgear, remove all yellow and red shipping caps on bushings and bushing wells, and replace them with a suitable system of insulated separable connectors (elbows), insulating protective covers, or plugs, as appropriate.

Failure to replace the shipping caps may result in flashover, equipment damage, serious personal injury, or death.

Switch Description

The Auto-jet[®] switch provides a unique method of load interruption, producing a laminated jet of air which extinguishes the arc.

Auto-jet[®] switches have a heavy gauge steel, all welded base frame that assures proper alignment and eliminates any problem of switch-to-enclosure alignment. A quick-make, quick-break stored energy mechanism with heavy duty, long life die springs provides high speed opening and closing independent of the operating handle speed. This durable mechanism assures safe load make, 3-time fault closing capability, and load interruption with the Auto-jet[®] interrupter.

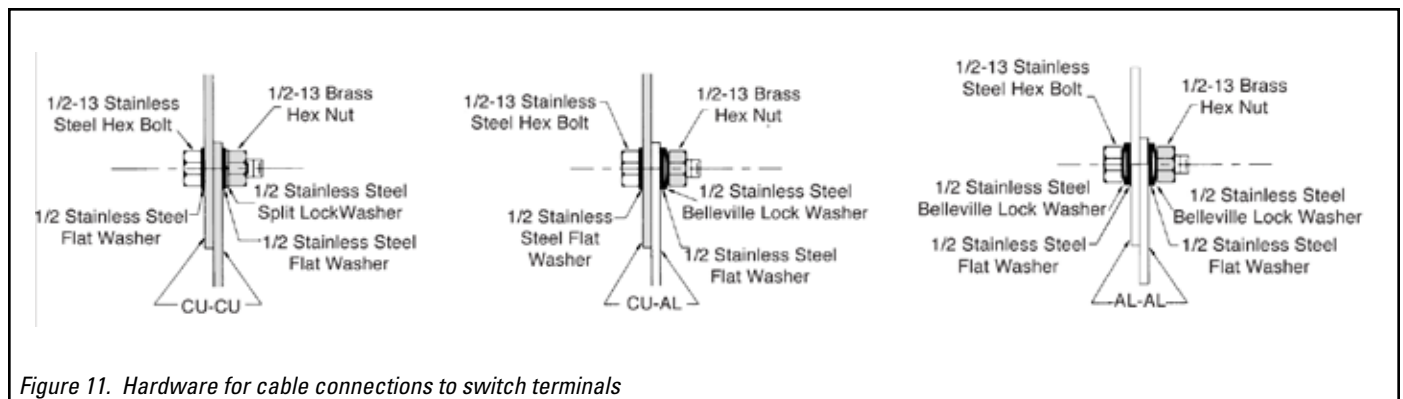
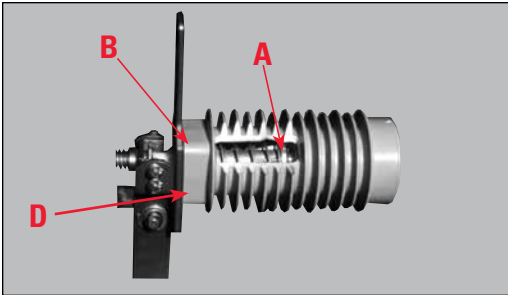


Figure 11. Hardware for cable connections to switch terminals

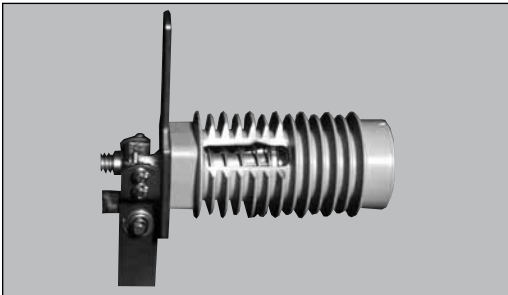
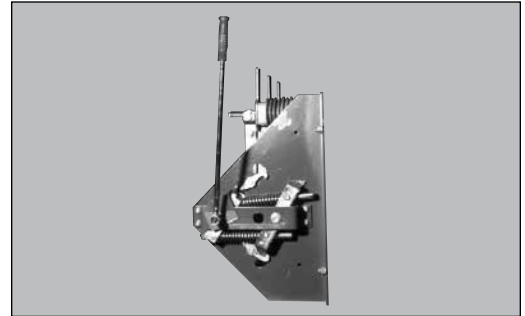
Switch Operating Sequence

The Auto-jet[®] interrupter consists of a piston (A) mounted in the cavity of the upper insulator. The movable arcing probe (B) engages a tulip contact (C) inside the piston. As the switch blade is pulled open by the stored energy mechanism, the main contacts (D) separate. The piston is pulled forward by means of the movable arcing probe, which compresses a heavy gauge spring encircling the piston and a spring encircling the arcing probe. At the end of

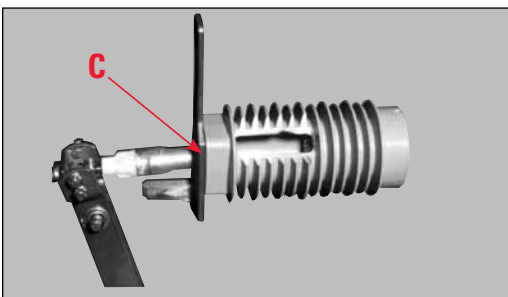
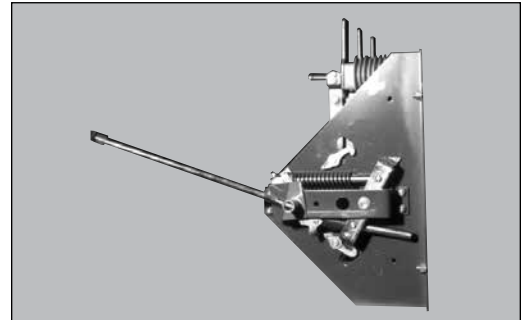
its travel, the piston separates from the arcing probe and, under the action of the heavy spring, is rapidly pushed backward into the cavity. This travel produces a jet of laminar flow compressed air up through the hollow center of the piston, which extinguishes the arc. The spring encircling the movable arcing probe rapidly retracts the probe and increases the speed of separation, which prevents restriking.



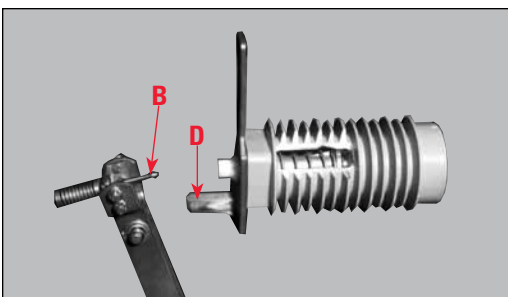
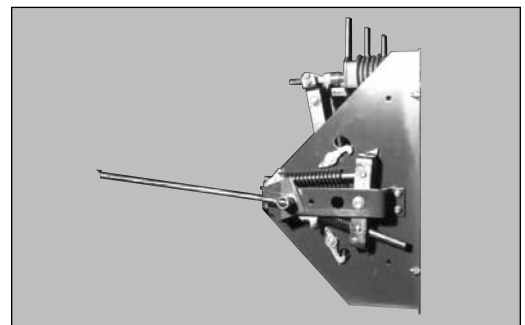
Switch closed with opening spring relaxed.



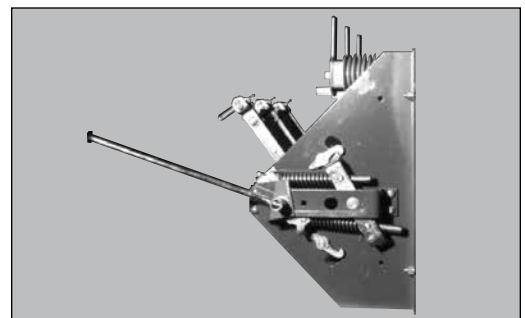
Switch closed with opening spring charged by manual operating handle.



Main contacts parted, puffer and arcing springs charged. (Simulated condition for illustrative purposes, actual duration of event is approximately 1/2 cycle.)



Switch open with latch engaged to hold switch in position.



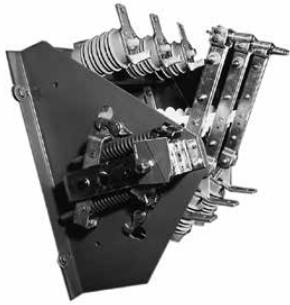


Figure 12.
 15kV Auto-jet® II Switch

SWITCH RATINGS

Nom.	KVA			Amperes, RMS			Fault-Close Duty Cycle*	
	Max. Des.	BIL	Cont.	Interrupting				
				Load	Cap.	Mag.		
15	17	95	600	600	100	21	40	3
15	17	95	1200	1200	100	21	40	3
25	27	125	600	600	100	21	40	3

*The three time duty-cycle fault-closing rating means that the switch can be closed three times into rated fault amperes and remain operable and able to carry and interrupt its rated load current.

WARNING

To avoid exposure to potential arcing conditions, it is recommended that all switching operations with the Auto-jet® switch be performed with all barriers in place and with all enclosure doors closed and latched.

Operating the Auto-Jet® Switch

1. Remove padlock and open the switch operating pocket access cover. See Figure 13.
2. Remove the switch operating handle from storage clips, unfold the handle, and secure in the extended position by sliding the clamp over the hinged section (Figure 14). Place the handle on the hex switch-operating shaft (Figure 15). If provision to padlock switch in open or closed position is provided (K2 option), padlock must be removed before access to hex switch-operating shaft can be accomplished.

If optional key interlock(s) are provided, switch may be locked in the open position.
3. Rotate handle in the direction indicated to open or close switch as desired. Verify switch position by observing the switch position indicator. See Figure 15.
4. Remove the handle, fold it for storage, and place in the correct orientation on the clips for storage.
5. Close switch operating pocket access cover (Figure 16) and padlock.

CAUTION

Access cover should be padlocked whenever switchgear is left unattended.

WARNING

The standard switch barrier system provides Dual-Purpose (DP) Barriers for temporary insertion into the open gap when switch is in the open position (Figure 17). Should an attempt be made to close the switch with the DP barriers in the inserted position, the DP barriers will prevent the switch blades from closing (Figure 18). Should this occur, turn the switch handle briskly in the direction required to open the switch. The switch mechanism will latch and a distinct click will be heard and spring force no longer tends to rotate the handle. Remove the DP barrier and return it to the hanging position. The switch may be closed in the normal manner.

In the event the mechanism did not re-latch, wearing full protective equipment and clothing, open the switch compartment door, using a grapple tool installed on a universal pole, insert the grapple prong in the barrier ring and pull the barrier out of the gear. It may be necessary to back drive the mechanism to relieve blade pressure on the barrier.

WARNING

Dual-Purpose Barriers should not be left in the slide-in position for more than one week. Accumulation of contamination on the barrier may cause tracking that can ultimately lead to a flashover. Clean any contaminated barrier per "Maintenance" instructions on page 17.

Figure 13. Remove padlock and open door.



Figure 14. Remove handle. (Handle is attached by a cable.) Unfold handle and slide clip over pivot joint to secure handle in the extended position.



Figure 15. Place handle socket on switch-operating shaft. Rotate handle in direction as indicated.



Operating Pocket Access Cover

Figure 16. Exterior view showing switch operating pocket access cover.



Figure 17. Switch DP barrier shown in normal hanging position. Optional clear polycarbonate DP barriers are pictured in normal hanging position in bottom photo.

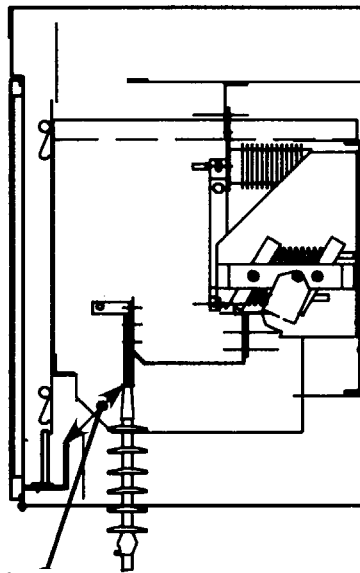


Figure 18. Switch DP barrier in slide-in position. Optional clear polycarbonate DP barriers are pictured in slide-in position in bottom photo.

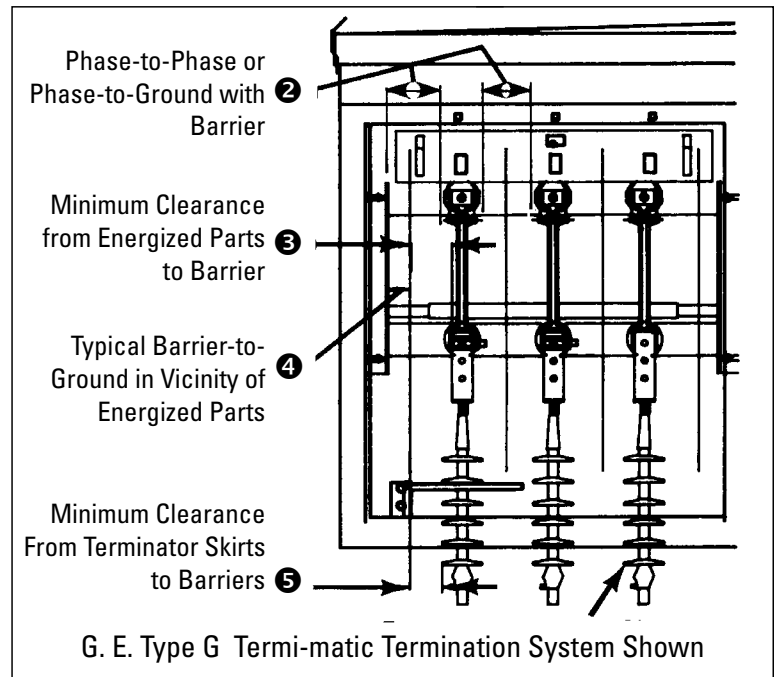


Recommended Clearances

15kV, 25kV Pad-mounted Unit Rating kV, BIL	Recommended Clearances (Minimum) In Inches				
	Phase-to-Phase or Phase-to- Ground Without Barrier NOTE ❶	Phase-to-Phase or Phase-to- Ground With Barrier NOTE ❷	Energized Bus (or device) to Barrier NOTE ❸	Barrier-to- Ground in Vicinity of Energized Bus (or device) NOTE ❹	Terminator Skirts to Barriers NOTE ❺
95	5-1/2	3"	1"	3/4"	1/2"
125	7-1/2	5"	2-1/4"	2"	1-1/4"



❶ Minimum clearance from energized parts to electrical ground without barrier.



Fuse Description

The PLD pivoting fuse mounting provides a convenient means to install fuses during initial energization as well as during fuse replacement. The fuse mounting includes an interlocking latch that prevents access to fuses unless the elbow connector is removed, while also providing a convenient means to unlatch and lower the fuse mounting.

The PLD fuse mountings include a heavy gauge formed channel base with viewing windows to observe the blown fuse indicator. A GPO-3 fiberglass barrier blocks access to the interior of the PLD unit, precluding exposure to high voltage, while the fuse mounting is lowered. When the fuse mounting is in the lowered position, the fuse is completely de-energized and isolated from high voltage. A locking bracket secures the fuse mounting to the door stile, facilitating fuse removal.



Figure 19. Fuse compartments with doors secured open.

Fuse Removal

1. Open appropriate fuse compartment door and secure with the wind stop. See Figure 19.
2. Install the grappler tool on the universal head of the shotgun clamp stick.
3. Using the ratcheting head hook of the shotgun clamp stick, install the feed-through standoff bushing on the parking stand. See Figure 20.
4. If appropriate for operating circumstances of the system, test the elbow to be moved for voltage. After verifying that voltage is not present, secure the shotgun clamp stick hook on the elbow pull loop and remove the elbow connector from the appropriate bushing well, following standard system operating procedures and the elbow manufacturer's instructions. Move the elbow connector onto a standard feed-thru standoff bushing that is placed in the parking stand. See Figures 21, 22, and 23.
5. Install an insulating protective cover on the exposed 200 amp bushing well insert. See Figure 24.



Figure 20. Feed through standoff bushing installed on parking stand.

WARNING

Before installing grounding elbows, test for voltage. Failure to properly test for voltage to establish that circuit is de-energized before installing grounding elbow may result in equipment damage, personal injury or death.

6. If appropriate for operating circumstances of the system, test the remaining feed-through standoff bushing for voltage and, after confirming that voltage is not present, then install a grounding elbow on the remaining bushing.
7. The fuse-panel latch interlock prevents access to fuses unless the elbow connector is removed to allow release of the interlock. Secure the shotgun clamp stick to the interlock lever and raise the interlock. See Figures 25 and 26.



Figure 21. Shotgun clamp stick secured to elbow for removal/connection.

8. With the shotgun clamp stick still secured on the interlock lever, pull on the fuse panel; lower it to a horizontal position and release the shotgun clamp stick. See Figure 27.
9. Rotate the locking bracket to secure the fuse access plate down against the lower door stile. The locking bracket is located on the side of the fuse access plate. See Figure 28.
10. Make certain that the fuse retainer bail, located at the pulling end of the fuse assembly, has been pivoted off the end fitting. See Figure 29.
11. Secure the hook of the shotgun clamp stick to the fuse pull ring. Pull and lift the fuse assembly from the fuse mounting. See Figures 30 and 31. Alternately, if user's standard operating procedures permit, the fuse assembly may be removed from the fuse mounting using an insulating-gloved hand because in the lowered position the fuse mounting is isolated at both ends from high voltage. See Figure 33. If optional fuse storage hooks (suffix -E3 or -E4) are provided, the complete fuse assembly can be stored on the hooks, which are mounted on the fuse-compartment door. See Figure 32.
12. Re-fuse using the procedures included with the fuse manufacturer's replacement fuse (or refill) unit.



Figure 22. Shotgun clamp stick secured to elbow with elbow in process of being removed/connected to bushing insert.



Figure 24. Insulating protective cover installed on bushing-well insert.



Figure 23. Shotgun clamp stick secured to elbow with elbow moved to feed through stand-off bushing on parking stand.



Figure 25. Shotgun-clamp stick secured to interlock lever.

13. Release the locking bracket that holds the fuse mounting down against the lower door stile. See Figure 28.
14. Re-install the hook of the shotgun clamp stick onto the pull ring of the fuse assembly. Then lift and place fuse assembly into fuse mounting in the horizontal position, in the reverse of Figures 25, 26, and 27. Alternately, if user's standard operating procedures permit, the fuse assembly may be placed in the

fuse mounting using an insulating-gloved hand because in the lowered position the fuse mounting is isolated at both ends from high voltage. See Figure 29.

15. Before removing hook from fuse pull ring, push firmly to assure that the fuse assembly is completely seated in the hinge, closed and latched.



Figure 26. Interlock lever being raised to unlocked position (or lowered to locked position).

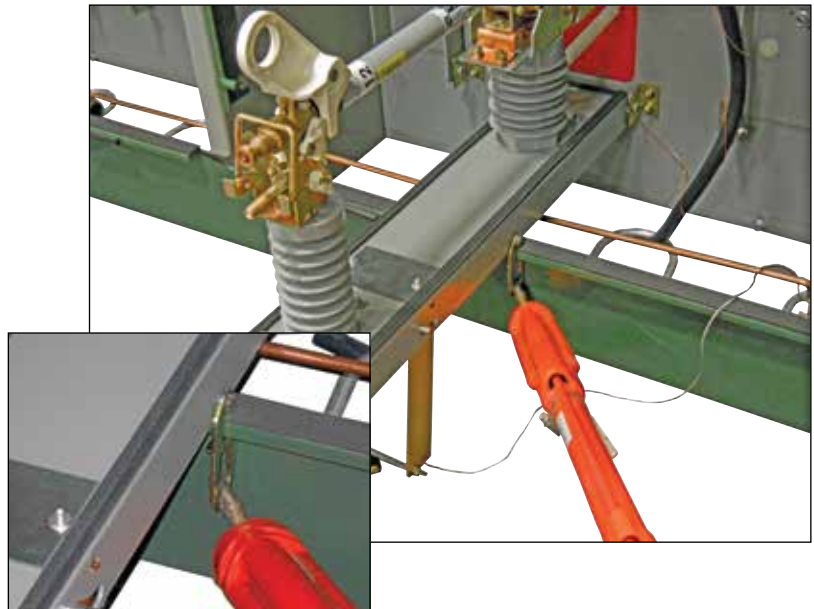
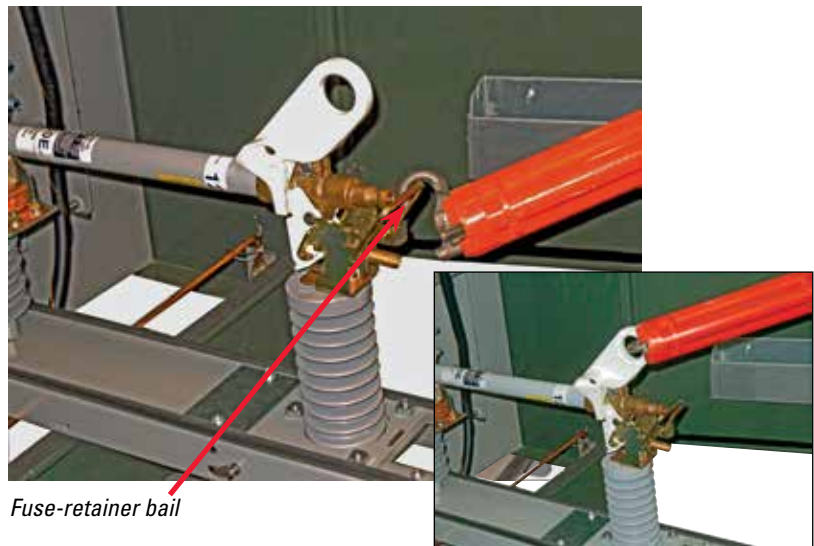


Figure 28. Locking bracket being set in place to secure fuse mounting against door rail.



Figure 27. Fuse mounting being lowered to access fuse (or raised to reinstall fuse).



Fuse-retainer bail

Figure 29. To release fuse latch, insert cone of grappler into fuse pull ring with prongs cradling body of fuse unit. Lift on end of shotgun clamp stick to release latch. Remove grappler from fuse pull ring.

16. Secure the shotgun clamp stick to the fuse mounting interlock lever. Then raise the fuse panel and latch it closed.
17. Lower the interlock lever.
18. If applicable, remove the insulating protective cover from the bushing-well insert.
19. Move the elbow connector from the feed-through standoff bushing onto the 200 ampere bushing well insert.
20. If applicable, remove the grounding elbow from the feed-through standoff bushing.
21. Remove the feed-through standoff bushing.
22. Close and padlock the main door before leaving gear.

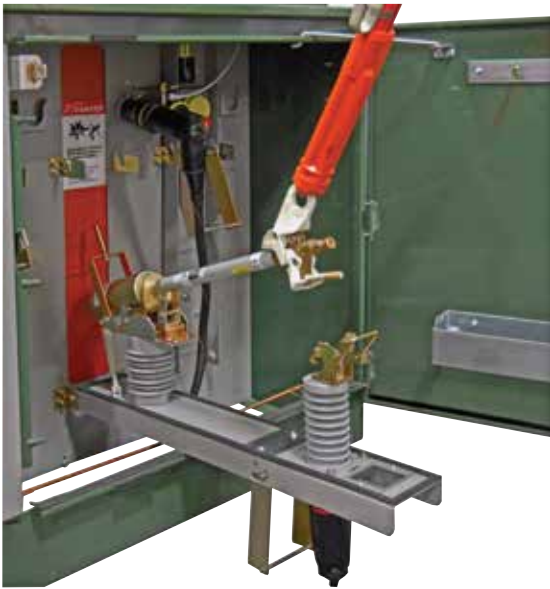


Figure 30. By pulling shotgun clamp stick upward, fuse will unlatch.



Figure 32. Fuse fully removed from fuse mounting and stored on optional fuse storage hooks on door.



Figure 31. Shotgun clamp stick secured to fuse pull ring and fuse assembly being lifted from the latched position and being removed from fuse hinge.



Internal contact and bushing well are visible, fuse is totally isolated at both ends.

Figure 33. Alternate method using insulating-gloved hand, if user's standard operating procedures permit, to remove fuse from fuse mounting.



Fuse Ratings

Fuse Manufacturer and Type†	Amperes, RMS		3-Phase MVA Sym
	Max. Cont.	Interrupting Sym ⑤⑥	
At 14.4 kV Nominal Voltage • 95kV BIL ①			
S&C SM-4	200	12,500	310
S&C SMU-20	200	14,000	350
S&C SM-5 ⑦	N/A	N/A	N/A
Eaton DBU	200	14,000	350
Cooper (M-E)	②	50,000	620
At 25kV Nominal Voltage • 125kV BIL ③			
S&C SM-4	200	12,500	540
S&C SMU-20	200	12,500	540
S&C SM-5 ⑦	N/A	N/A	N/A
Eaton DBU	200	12,500	540
Cooper (M-E)	④	50,000	1,080

† The fuse must be replaced after each interruption. Refer to S&C instruction manual for SML-4Z holder and SML-20 end fitting maintenance required after each fault close or fault interruption.

① 14.4kV Nominal

SM-4 fused units require three S&C Cat. No. 86632R2 SM-4Z fuse holders and three S&C SM-4 fuse refills per fuse compartment. ††

SMU-20 fused units require three S&C Cat. No. 3097 SM-20 fuse end fittings and three S&C SMU-20 fuse units per fuse compartment. ††

DBU fused units require three FP Cat. No. EFA-42 DBU end fittings and three Eaton DBU fuse units per fuse compartment. ††

② NX fuses units: PSE fuse mountings will accommodate one 100 ampere Cooper (M-E) type NX current limiting fuse rated 8.3kV, one 100 ampere fuse rated 13.5kV, or one 80 ampere fuse rated 15kV. ††

③ 25kV Nominal

SM-4 fused units require three S&C Cat. No. 86633R2 SM-4Z fuse holders and three S&C SM-4 fuse refills per fuse compartment. ††

SMU-20 fused units require three S&C Cat. No. 3097 SM-20 fuse end fittings and three S&C SMU-20 fuse units per fuse compartments. ††

DBU fused units require three FP Cat. No. EFA-42 DBU end fittings and three Eaton DBU fuse units per fuse compartment. ††

④ NX fused units: PSE fuse mountings will accommodate one 100 ampere Cooper (McGraw-Edison) type NX current limiting fuse rated 13.5kV, one 80 ampere fuse rated 15kV, or one 40 ampere fuse rated 23kV. ††

⑤ Ratings expressed in RMS amperes asymmetrical are 1.6 times the symmetrical values listed.

⑥ Unit overall ratings are limited to the lowest component rating.

⑦ SM-5 fused units not available in PLD units.

⑧ SM-5S fuses can be accommodated in certain specific designs of Federal Pacific Pad-mounted Switchgear. Refer to the factory.

†† For fuse application and ordering information, refer to the current issue of the applicable fuse manufacturer's literature.

Maintenance

Federal Pacific switchgear does not require routine mechanical or electrical maintenance. However, the following are some recommendations for enhancing continued service of the equipment.

1. Yearly mechanical exercising of the switch is recommended.

⚠ WARNING

The switchgear must be completely de-energized from all sources of power before any attempt is made to enter switchgear.

2. Check for cleanliness generally, but particularly for accumulation of any foreign material on insulators.

NOTICE

Barriers and insulators can be cleaned with a non-alcohol based cleaner that does not leave any residue when dry. Residue must be removed.

⚠ CAUTION

Do not put any lubricant on switch probe or puffer.

3. If the switch is closed on a short circuit within the fault closing rating and the short circuit is cleared by circuit breakers or fuses, the switch will not sustain damage which would require major repairs. However, the switch should be inspected before returning to service to determine switch condition.

⚠ WARNING

Dual-Purpose Barriers should not be left in the slide-in position for more than one week. Accumulation of contamination on the barrier may cause tracking that can ultimately lead to a flashover. Clean any contaminated barrier per "Maintenance" instructions above.

Optional Features

Standard options can be supplied that best serve the customer's needs and operating practices. These are listed below with the applicable catalog number suffix.

Base Spacer

(Options A2 through A9; AS for stainless steel base spacers)
 Non-compartmented or compartmented

Barriers For Switches — Inner Door

(Option B4 or B5)

Hinged insulating barrier secured with penta-head bolt or hex-head bolt

Fuse Storage Hooks (Option E1 through E3)

Finish Color (Option F3)

Ground Studs For Switches (Option G2)

Distribution Surge Arresters For Switches
 (Options S1-S13)

Cable Supports (Options T3 and T4; see below)

Terminal Adapters For Switches (Option T5)

Fault Indicators (Options T6 and T7)

Copper Bus (Option C)

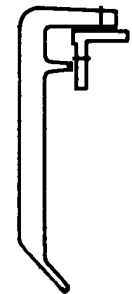
Strip Heaters

Stainless Steel Enclosure Exterior (Option F4)

Cable Supports For Switches

Cable Supports for .75" to 2.0" Cable O.D.

1. Attach cable support to angle with arrow on support pointing up. Remove protective sheet from adhesive surface.



2. Place cable against adhesive saddle and install cable wrap starting at the top tie-horn.

