

Switchgear, 27 kV, Three-Phase, Live-Front, Padmount



1. Scope

This standard covers 27 kV, three-phase, live-front, padmount switchgear and related accessories.

This standard applies to the following Seattle City Light (SCL) stock numbers:

Type	Stock No.
PMH-5	250195
PMH-9	250190
PMH-10	250192
PMH-11	014292
PMH-12	250191

For replacement parts for the switchgear included in this standard, see SCL 4507.95.

For compatible fuses, see SCL 6840.10 and SCL 6840.15.

2. Application

Live-front PMH-9, -10, -11, and -12 switchgear are no longer standard. They have been replaced by equivalent dead-front style PME/PSE switchgear. All new and replacement switchgear should be dead-front style. See SCL 4507.80 for dead-front switchgear requirements.

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PMH-5 switchgear is replaced by a two-way SF6-free switchgear, SCL Stock No. 014801 for locations where the available fault current is less than 16 kA rms symmetrical. For locations where the available fault current exceeds 16 kA, a two-way Vista switchgear, SCL Stock No. 012673, is to be used. See SCL 4501.65 and SCL 4502.65 for details.

The PMH-5 switchgear is intended for use on 27 kV, three-phase, 60 Hz, grounded neutral underground distribution systems where the available fault current is less than 12.5 kA rms symmetrical.

PMH, as it pertains to the switchgear discussed in this standard, is an S&C Electric Company abbreviation for Pad Mount Hot; in other words, padmount, live-front switchgear.

PMH-5 switchgear is for replacement only. Contact System Planning and Protective Relaying prior to ordering PMH-5 switchgear.

3. Industry Standards

Except as modified by this standard, switchgear shall meet the applicable requirements of the latest versions of the following industry standards:

IEEE C37.20.3; IEEE Standard for Metal-Enclosed Interrupter Switchgear (1 kV – 38 kV)

IEEE C37.71; Three-Phase Manually Operated Subsurface and Vault Load-Interrupting Switches for Alternating-Current Systems”

IEEE C37.73; IEEE Standard Requirements for Pad-Mounted Fused Switchgear

IEEE C37.74; Standard Requirements for Subsurface, Vault, and Padmounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating-Current Systems up to 38 kV

IEEE C57.12.28; IEEE Standard for Pad-Mounted Equipment Enclosure Integrity

IEEE C57.12.29; IEEE Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments

4. Construction

4.1 General

The switchgear assembly shall be integrally designed and produced by the manufacturer of the individual switch components. The manufacturer shall be solely responsible for the performance of the individual switch components as well as the assembly.

All switchgear components shall be factory assembled and tested.

4.2 Design Changes

The manufacturer shall inform SCL in writing of all design changes that could affect the understood or published capabilities of the switchgear.

4.3 Quality

Switchgear design and construction shall be of high quality and provide safe and reliable operation with minimal maintenance over the life of the product.

4.4 Switchgear Ratings

The switchgear assembly shall have the following electrical ratings:

Switchgear

Maximum voltage	27 kV
Main bus continuous current	600 A
Basic insulation level (BIL)	125 kV

Short circuit current ratings

Peak withstand current (peak)	32.5 kA
One-second short-time withstand current (rms symmetrical)	12.5 kA
MVA, three-phase symmetrical at rated nominal voltage	540 MVA
Rated Frequency	60 Hz
Number of phases	3

4.5 Three-Phase Interrupter Switches

Interrupter switches shall have the following electrical ratings:

Continuous current	600 A
Load dropping current	600 A
Rated peak withstand current (peak)	32.5 kA
One-second short-time withstand current (rms symmetrical)	12.5 kA

4.6 Power Fuses with Load Interrupters (Uni-Rupter)

Power fuses with load interrupters shall have the following electrical ratings:

Fuse mounting continuous current rating	200 A
Fuse continuous current	200 A
Fuse load dropping current	200 A
Rated short-time (1s) withstand current (rms symmetrical)	12.5 kA

4.7 Electronic Fault-Fiter Fuses (Disconnect Style)

Electronic Fault-Fiter fuses shall have the following electrical ratings:

Fuse mounting continuous current rating	600 A
Fuse continuous current	600 A
Fuse load dropping current	None
Minimum interrupting rating (rms symmetrical)	12.5 kA

Each fused tap, fuse, and fuse assembly shall be capable of withstanding full line-to-line voltage of 27 kV across each fuse unit after operation.

Each electronic fuse compartment shall be furnished with holders for three electronic fuses.

4.8 Motor Operators

PMH-5 type switches shall be supplied with factory installed S&C type PM motor operators, including 24 Vdc ZSD relay with a 400 A blocking level, potential transformer, current transformers, battery packs, and battery charger.

4.9 Fault-Indicator Mounting

The switch manufacturer shall incorporate mounting provisions for three-phase fault indicators.

4.10 Enclosure

The switchgear cabinet shall be constructed to provide adequate space, volume, and strength for fuse handling, fuse exhaust, and venting, and shall withstand all pressure build-up during interruption without permanent distortion or damage to any portion of the structure.

The cabinet shall be stainless steel with an olive green finish.

Switch compartments shall be equipped with a viewing window for fault indicators.

The entire underside of the roof shall be coated with a "no-drip" asphalt-base mastic

Provisions for securing the enclosure to the concrete pad shall include attachments for all four sides.

5. Nameplate

Each switch shall be provided with a nameplate that meets the requirements of IEEE C37.71.

6. Documentation

One instruction book shall be securely attached to each switch in an ultraviolet light-resistant envelope.

Provision shall be made for SCL to obtain PDF files of all relevant, switch-specific documentation, such as:

- Installation instructions
- Operation and maintenance instructions
- Outline drawings
- Wiring and schematic drawings

7. Packaging

Each switch shall be packaged in its own crate and delivered on its own pallet.

The pallet shall be compatible with either a pallet jack or forklift.

The two openings for the pallet jack or forklift shall have a minimum height of 4 in and width of 21 in.

The crate and pallet, including slats, blocking, and wedges, shall be unpainted wood.

The outside of each crate shall be permanently and clearly marked with:

- Manufacturer name or symbol
- Seattle City Light purchase order number
- Seattle City Light stock number
- Manufacturer equipment serial number

8. Shipping

Switches may be delivered on enclosed, covered, or flatbed trucks. If switches are delivered on a flatbed truck, switches shall be side-loaded. Because Washington State law requires a 10-in minimum side board when driving a forklift or pallet jack onto the bed of a truck or trailer, most flatbed trucks or trailers must be side-loaded to ease off-loading.

9. Issuance

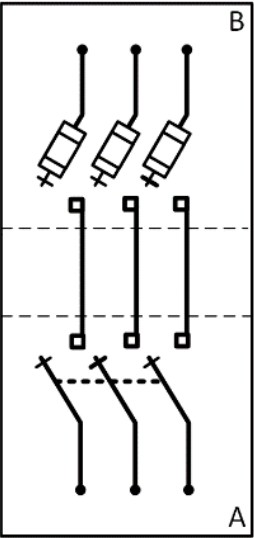
Stock Unit: EA

10. Detailed Requirements

10.1 PMH-5 Switchgear

Stock No.	S&C Electric Co. Catalog No.
250195	156513R3-A10-F12-K20-E102
where:	
	1 = One switch operator
	56 = Remote supervisory switch
	5 = Fault-Fiter fuse
	1 = PMH-5
	3 = 25 kV
	R3 = 3rd revision product update
	A10 = Stainless steel enclosure with olive green outdoor Ultradur finish
	F12 = Mounting provisions for a fault indicator in each switch compartment with viewing window in door
	K20 = 24" stainless steel base spacer
	E102 = A special suffix that includes the following features:
	40 kA Mini-Rupter switch 600 A disconnect-style Fault-Fiter electronic fuses in Compartment 2 4745 connectors on switch and fuse pads "Reminder Package" barrier assembly in Compartment 2 24" stainless steel base spacer 24 Vdc battery charger, battery packs with internal control power by S&C Voltage Sensor - ZSD with 400 A blocking level

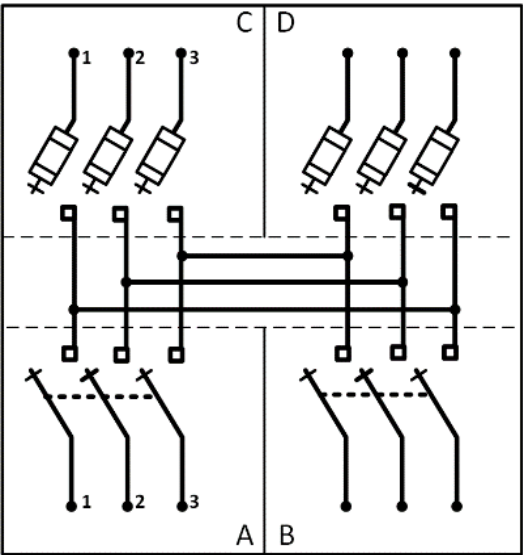
Figure 10.1. PMH-5 Switchgear Connection Diagram



10.2 PMH-9 Switchgear

Stock No.	S&C Electric Co. Catalog No.
250190	55153R4-A10-F12-K18
where:	
55 =	Manual
1 =	SML-20 Fuse
5 =	PMH-9
3 =	25 kV
R4 =	4th Revision Product Update (effective 2005)
A10 =	Stainless steel enclosure with olive green outdoor Ultradur finish
F12 =	Mounting provisions for a fault indicator in each switch compartment with viewing window in door
K18 =	12" stainless steel base spacer

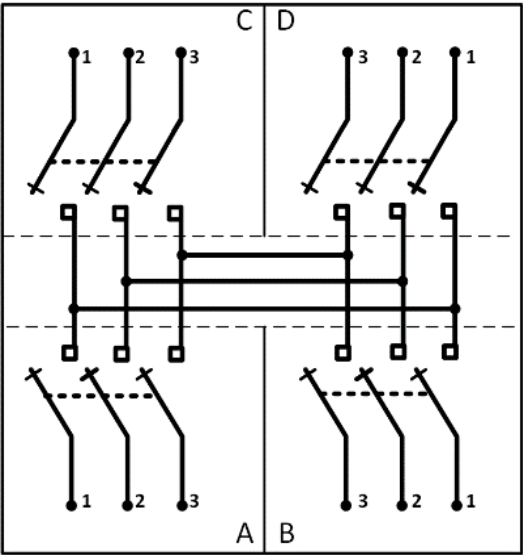
Figure 10.2. PMH-9 Switchgear Connection Diagram



10.3 PMH-10 Switchgear

Stock No.	S&C Electric Co. Catalog No.
250192	55243R4-A10-F12-K18
where:	
	55 = Manual
	2 = No fuses
	4 = PMH-10
	3 = 25 kV
	R4 = 4 th Revision Product Update (effective 2005)
	A10 = Stainless steel enclosure with olive green outdoor Ultradur finish
	F12 = Mounting provisions for a fault indicator in each switch compartment with viewing window in door
	K18 = 12" stainless steel base spacer

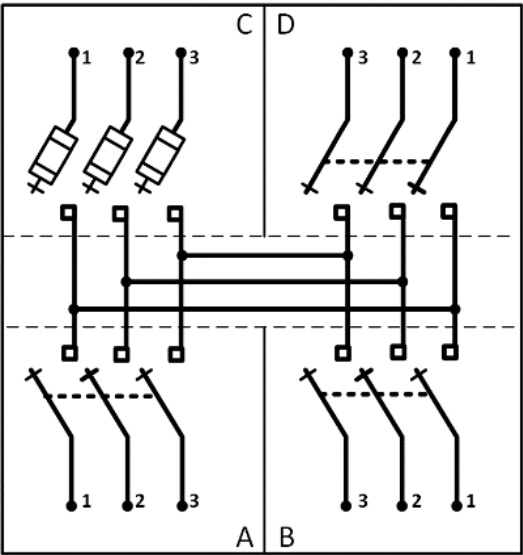
Figure 10.3. PMH-10 Switchgear Connection Diagram



10.4 PMH-11 Switchgear

Stock No.	S&C Electric Co. Catalog No.
014292	55163R4-A10-F12-K18
<i>where:</i>	
	55 = Manual
	1 = SML-20 fuse
	6 = PMH-11
	3 = 25 kV
	R4 = 4th Revision Product Update (effective 2005)
	A10 = Stainless steel enclosure with olive green outdoor Ultradur finish
	F12 = Mounting provisions for a fault indicator in each switch compartment with viewing window in door
	K18 = 12" stainless steel base spacer

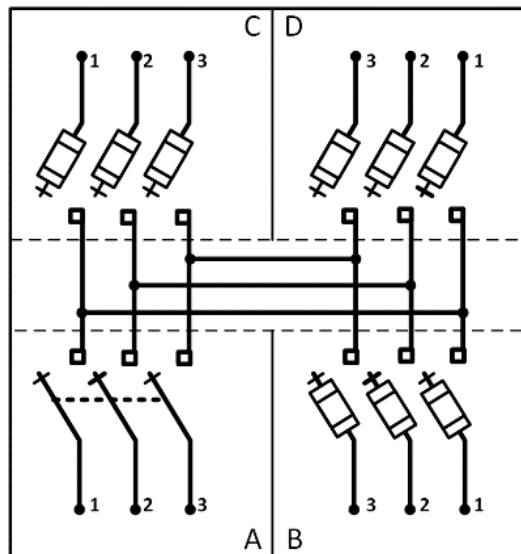
Figure 10.4. PMH-11 Switchgear Connection Diagram



10.5 PMH-12 Switchgear

Stock No.	S&C Electric Co. Catalog No.
250191	55173R4-A10-F12-K18
where:	
	55 = Manual
	1 = SML-20 fuse
	7 = PMH-12
	3 = 25 kV
	R4 = 4th Revision Product Update (effective 2005)
	A10 = Stainless steel enclosure with olive green outdoor Ultradur finish
	F12 = Mounting provisions for a fault indicator in each switch compartment with viewing window in door
	K18 = 12" stainless steel base spacer

Figure 10.5. PMH-12 Switchgear Connection Diagram



11. Loose Parts

11.1 Four-Compartment Switch

Each four-compartment switch (PMH-9 through PMH-12) shall be shipped with the upper and lower SML-20 end fittings (S&C Part No. SA-40053 and FD-2602), anchor bolt bracket (S&C Part No. CO-1720), and cable connector assembly (S&C Part No. 4745T) placed securely inside the switch.

11.2 Two-Compartment Switch

Each two-compartment switch (PMH-5) shall be shipped assembled with a Fault-Fiter holder assembly (S&C Part No. 99113). The cable connector assembly (S&C Part No. 4745T) and anchor bolt bracket (S&C Part No. CO-1720) shall also be included in a box and placed securely inside the switch.

12. References

- SCL Material Standard 4501.65**; "29 kV, Three-Phase, SF6, Multi-Purpose Switchgear, Manually Controlled"
- SCL Material Standard 4502.65**; "27 kV, Three-Phase, SF6-Free, Two-Way Switchgear"
- SCL Material Standard 4507.80**; "Switchgear, 27 kV, Three-Phase, Dead-Front, Padmount"
- SCL Material Standard 4507.95**; "Padmount PMH Switchgear, 27 kV, Parts"
- SCL Material Standard 6840.10**; "Fuses, 15.5 kV, Full-Range, Current-Limiting, Type X, Hinge Mounted"
- SCL Material Standard 6840.15**; "Fuses, 15.5 kV, Full-Range, Current-Limiting, Type X, Clip Style"

13. Sources

S&C 662A-31; S&C Manual PMH Pad-Mounted Gear Specification, December 19, 2011; S&C Electric Company

S&C 252-30; "S&C Power Fuses Types SM and SML, March 21, 1983; S&C Electric Company

SCL Material Standard 2501.9 (renumbered to 4507.90 in October 2015); "Switchgear, 27 kV, Three-Pole, Padmount"

Shetab, Muneer; SCL Standards Engineer, subject matter expert, and originator of 4507.90