Prepared by: ABB1

PAD-MOUNTED, LOAD-BREAK SWITCHES AND FUSES 053318

Asset Type: Electric Distribution

Function: Design and Construction

Issued by: Ryan Kowdley (RSKG)

Date: 11-01-18

Rev. #20: This document replaces PG&E Document 053318, Rev. #19. For a description of the changes, see Page 13.

Purpose and Scope

This document specifies pad-mounted, load-break switches and fuses.

General Information

1. The pad-mounted equipment shown in this document shall be designed, manufactured, and tested to meet the requirements of this document and all applicable American National Standards Institute (ANSI) and all applicable Institute of Electrical and Electronic Engineers (IEEE) standards including IEEE/ANSI Standard C37.74 and the Enclosure Integrity Standards C57.12.28 and C57.12.29. Note
2. This document shows ordering information, dimensions, and arrangements of S&C pad-mounted switchgear for three-phase, 12 kV, 17 kV, and 21 kV installations. Pad-mounted switchgear have a maximum voltage rating of either 14.4 kV or 25 kV. The switchgear include externally operable, three-phase, gang-operated switches and/or Type E power fuses. The switches have maximum load-break ratings of 600 amps for 14.4 kV and 25 kV switchgears. The Type E power fuses have ratings of 200 amps maximum continuous and 12,500 amps RMS symmetrical maximum interrupting. The switches have a maximum fault-close rating of 12,500 amps RMS symmetrical. Available sizes of Type E power fuses are shown in Document 015226.
3. Power fuses in S&C units do not require the use of the portable load-break tool. The power fuse mounting is equipped with load-break capability. A firm, steady opening pull on the fuse with the approved PMH Remote Operating Tool is required for interrupting or breaking load, and a swift non-hesitating stroke is required for closing or picking up load. Immediately after opening/breaking load, make sure to leave the approved PMH Remote Operating Tool in place until the fuse/disconnect comes to a full open, stop position. This will prevent a “bounce back” that could result in an arc that could flash to the cabinet. Refer to Utility Procedure TD-2908P-01 for other applicable requirements.
4. Fuse grappler and adapter for quick change live-line tools are supplied in each fuse cabinet.
5. Pad-mounted units, on the fuse side, are equipped with rigid insulating barriers to prevent accidental contact between grappler metal parts and adjacent phases, or accidental grounding of grappler to enclosure walls or other adjacent grounded surfaces. On the switch side (disconnect side), the 25 kV units have four barriers (interphase barriers and end barriers), and the 14.4 kV units have two barriers (interphase barriers only).
6. S&C equipment is subject to significant operating restrictions set forth in Utility Procedure TD-2908P-01 .
7. Do not operate pentahead door latch on PMH equipment with a battery powered impact tool. The over-torqueing of the mechanism can result in failure of the latch making it inoperative.. The door latch only takes a quarter of a turn with a four way pentahead tool or pentahead socket and ratchet.

Application

8. Most S&C equipment is restricted for replacement only and may not be used for new construction. This includes configurations of the PMH-5, PMH-6, PMH-9, and PMH-11.The PMH-3 is unrestricted at this time and may be used for new construction as well as replacement. The PMH-4 is no longer available.
9. Switchgear rated at 14.4 kV (maximum) are for use on 12 kV circuits. Switchgears rated at 25 kV (maximum) may be used on 12 kV, 17 kV, or 21 kV circuits. In 12 kV areas where there will be future 21 kV cutovers, switchgears rated at 25 kV with 23 kV–rated power fuses may be installed.

Pad-Mounted, Load-Break Switches and Fuses

10. The PMH pad-mounted switchgear is **not** rated to successfully interrupt pure capacitive current (approximately 0% power factor).This occurs when the switch is located directly feeding only a capacitor bank. If the switch is located in a normal location, such that it is feeding normal load and a capacitor bank with a power factor of 70% or greater, then the switch can successfully interrupt either the 200-amp or 600-amp rating of current.
11. Three-pole, load-break switches are suitable for main-line cable sectionalizing.
12. Single-pole power fuses can provide tap line or transformer fusing.

Grounding

13. Ground terminals are provided at each cable termination for attaching protective grounds.
14. Separate switch numbers shall be assigned to each three-phase line switch. Two identical switch number plates for each three-phase line switch shall be attached to the outside of the cabinet, one on the door (see Document 033582), and one at the switch handle location.

Location

15. All cabinets shall have a minimum distance from other structures of 8 feet in front, 8 feet in back, and 3 feet on each side. This provides adequate space for using hot tools and portable grounds.

References	Location	Document
Corrosion Resistant Ground Rods and Ground Rod Clamps	UG-1: Connectors/Greenbook	013109
Connectors for Insulated Cables Underground Distribution Systems	UG-1: Connectors/Greenbook	015251
Cutouts and Fuses for Underground Distribution Lines	UG-1: Switches	015226
Corporation Padlock With Chain	TIL	020861
Tags for Identifying Underground Cables and Equipment	UG-1: Marking	033582
Pad-Mounted, load-Break Switches and Fuses	UG-1 Switches	053318
Cables for Underground Distribution	UG-1:Cable	039955
Guide for the Planning and Design of Underground Distribution Systems	ELS	043904
Fault Indicators for Underground Application	UG-1: General	061683
Primary Electric Underground Equipment Enclosures	UG-1: Enclosures/Greenbook	062000
Underground Conduits	UG-1: Conduits	062288
Indoor Primary Cold Shrink Silicone Termination	UG-1: Terminations	065332
Installation of Automatic Pad-Mounted Interrupters for Underground Distribution Lines	UG-1: Switches	068188
Distribution Switching Procedures	TIL	TD-2908P-01

Table 1 List of Materials for Figure 1 on Page 4

Item	Description	Code	Document
1	Pad-Mounted, Load-Break Switches and Fuses (as required) (Pages 5 and 7) [1]	–	–
2	Concrete Pad, as Required (for Item 1) (see Page 9)	–	–
3	Cable, Insulated, for Underground Distribution (sizes as required)	–	039955
4	Cable,Termination (as required)	–	065332
5	Fault Indicator	–	061683
6	Terminal Connector, Bolted Type (cable-to-flat bar) (as required)	–	015251
7	Clamp, Ground Rod, 5/8”	187012	013109
8	Connector, Straight, Compression Type, Copper-to-Copper, 250 kcmil	305202	015251
9	Connector, Tap, Compression Type (size as required)	–	
10	Conduit, Size as Required (for Item 3)	–	062288
11	Padlock, Corporation	170040	020861
12	Compound, Caulking	495228	–
13	High Voltage/Maintain 8’ Clearance Label	621599	033582
14	Sectionalizing Tag	–	
15	Phase Designation Tag	–	
16	Switch Number Tag (specify numbering)	–	
17	Screw, Cap (bolt), Everdur, Hex Head, 1/2” x 1-1/2”	193023	015251
18	Nut, Bolt, Everdur, Hex, 1/2”	195013	
19	Washer, Round, Everdur, 1/2”	195252	
20	Washer, Lock, Everdur, 1/2”	195193	
21	Wire, Ground, No. 2 AWG, Solid Bare Copper [2]	290074	–

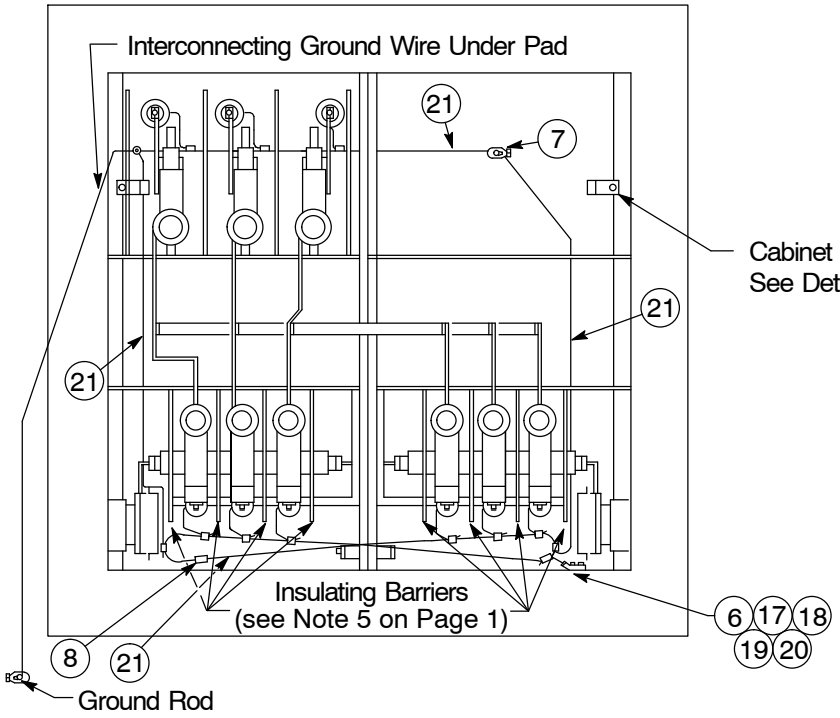
[1] These fuses are S&C Type SMU-20 power fuse units. See Document 015226 for sizes available and codes.
[2] If used in main-line application with 600 kcmil or larger cable, 250 kcmil standard bare copper will be required for neutral bypass sizing (see Plan View, Figure 1 on Page 4).

S&C PMH General Arrangement

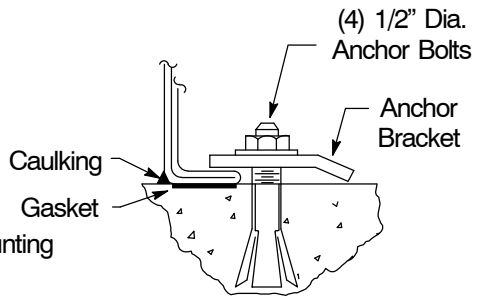
Notes

1. In order that the indicator will not trip due to fault current flow in the cable shield, the cable shield ground must pass back down through the fault indicator.
2. A splice and/or pull box (see Document 062000) should be positioned adjacent to the pad when necessary to facilitate cable termination.
3. Refer to Document 033582 for the location of external signs.
4. All cabinets shall be anchored as shown in Detail A on Page 4.

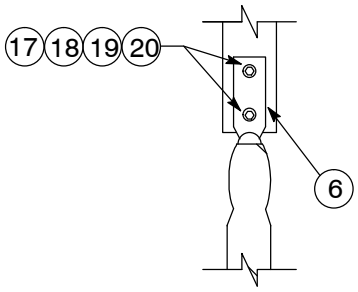
S&C PMH General Arrangement (continued)



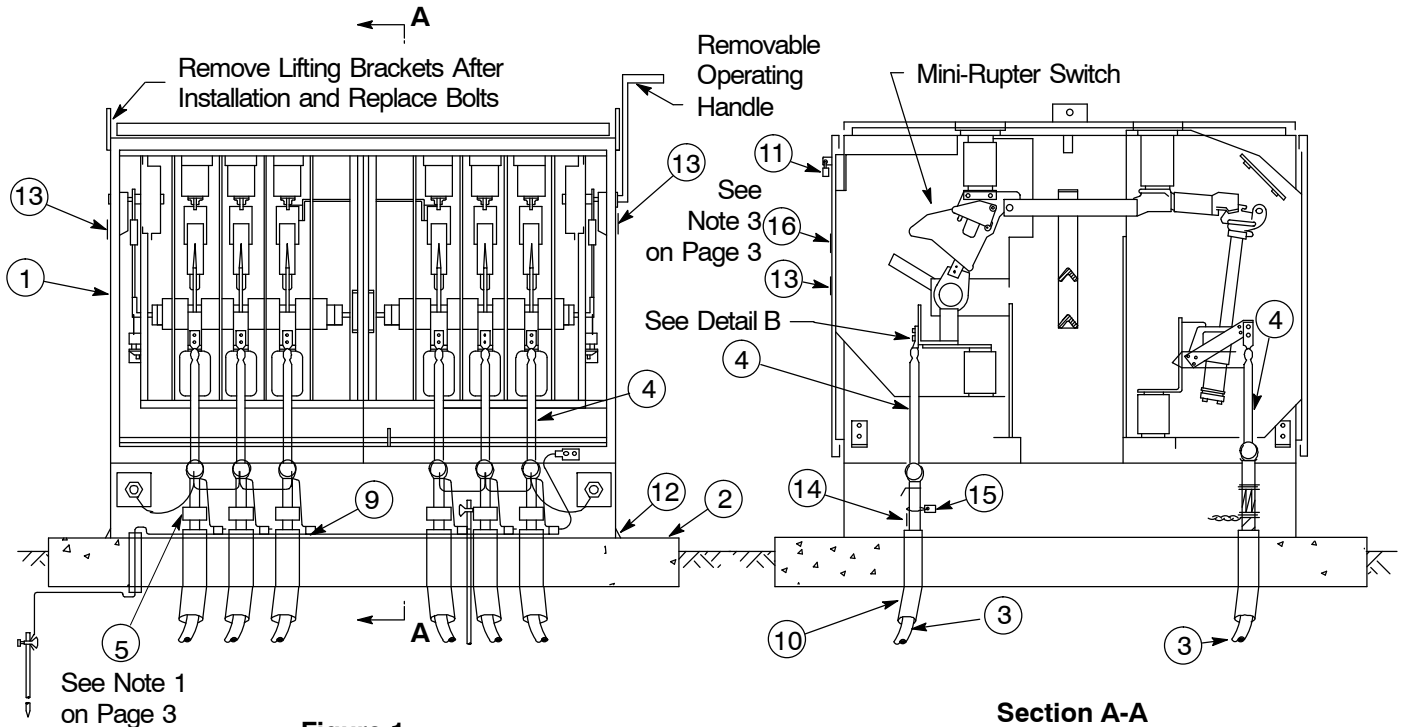
Plan View



Detail A
Cabinet Mounting



Detail B



Section A-A

Figure 1
Typical Installation
PMH-6 Illustrated

Types PMH-3 and PMH-4

Notes

1. The PMH-4 is no longer available. A PMI-4R or a 3-phase PMI should be used in it's place. The PMH-3 currently has no restrictions, although it is recommended that a 200A Pad-mounted Fault Interrupter (M342618) set permanently to switch mode be used in its place. Refer to Document 068188 for available pad-mounted fault interrupters to substitute for both the PMH-4 and PMH-3.
2. Doors shall have provisions for PG&E padlocks.
3. All terminal pads have two-hole NEMA drilling.
4. Fuse unit end fittings are included (S&C Catalog Number 3097). For replacements, use material code M330093.

Ordering Instructions

Step 1. Specify type, voltage rating, current rating, and code number. In addition, specify "In accordance with PG&E Document 053318".

Step 2. Order SMU-20 primary fuse units from Document 015226. (PMH–4 only) Other fuses are also av available.

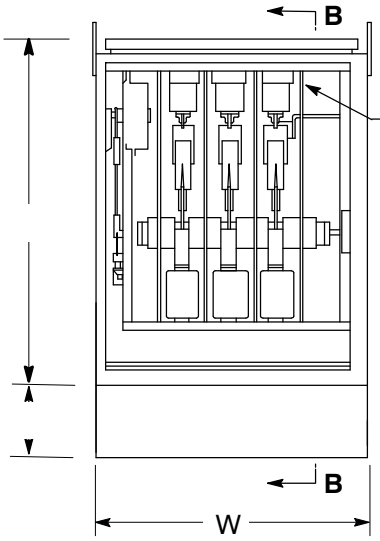
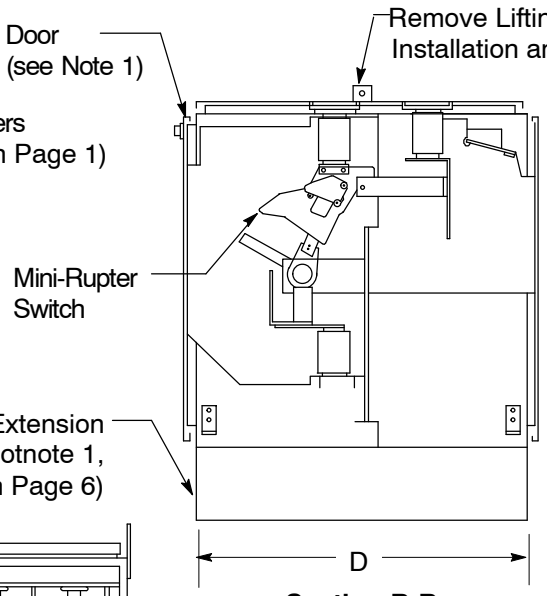
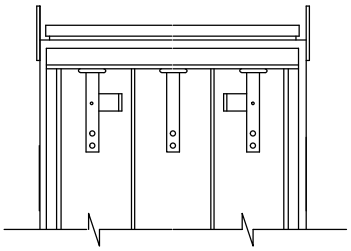


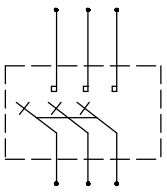
Figure 2
Front View
PMH-3 Shown
(door removed)



Section B-B



Detail C
Rear View
for Figure 2 and Figure 3
on Page 6



PMH-3
Diagram A

Table 2 Data for Types PMH-3 and PMH-4

Type	Rating kV	A[1]	D	H	W
		Inches			
PMH-3, PMH-4	14.4	–	37-3/4	44	37-7/8
	25	–	56-3/4	55	43

[1] See Table 3 for base extension sizes.

Pad-Mounted, Load-Break Switches and Fuses

Types PMH-3 and PMH-4 (continued)

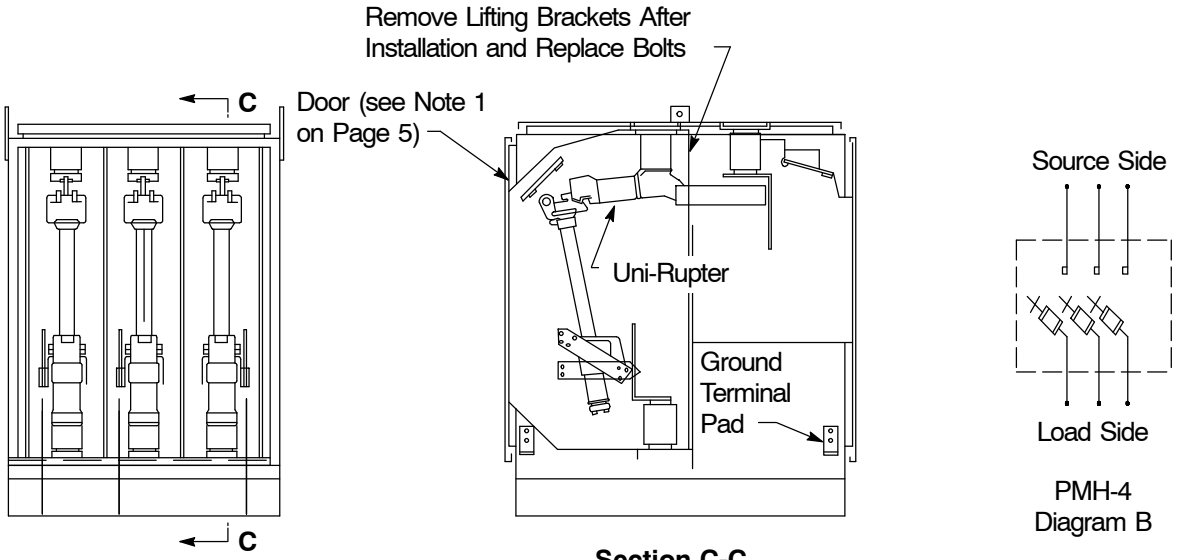


Figure 3
Front View
PMH-4 Shown
(door removed)

Table 3 Data and Codes for Types PMH-3 and PMH-4

Ratings			Type	Ext. Size (inches)	Code [1]	Weight (lbs.)
Voltage kV (maximum)	Amps					
	Switch [2, 3] (maximum cont.)	Fuse (maximum size)				
14.4 [4]	600	–	PMH-3	18	342746	750
	–	200	PMH-4	6	342747 [6]	725
25 [5]	600	–	PMH-3	12	342748	1,100
	–	200	PMH-4	6	342749 [6]	1,180

1 Code number includes the base extension shown in this table.
2 The emergency rating for 8 hours or less is 725 amperes.
3 600-amp continuous rating, 600-amp loop or parallel switching rating, and 600-amp load dropping rating.
4 Asymmetrical rating for momentary is 22,400 A and fault-closing is 20,000 A.
5 Asymmetrical rating for momentary and fault-closing is 20,000 A.
6 The PMH-4 is no longer available.

Types PMH-5, PMH-6, PMH-9, and PMH-11

Notes

1. The PMH-5, PMH-6, PMH-9, and PMH-11 are restricted to replacement use only. They may not be used for new construction. Refer to Document 068188 for available pad-mounted fault interrupters to substitute for these units for new construction.
2. Doors shall have provisions for PG&E padlocks.
3. All terminal pads have two-hole NEMA drilling.
4. Fuse unit end fittings are included (S&C Catalog Number 3097). For replacements, use material code M330093.

Ordering Instructions

Step 1. Specify type, voltage rating, current rating, and code number. In addition, specify "In accordance with PG&E Document 053318".

Step 2. Order SMU-20 primary fuse units from Document 015226. Other fuses are also av available.

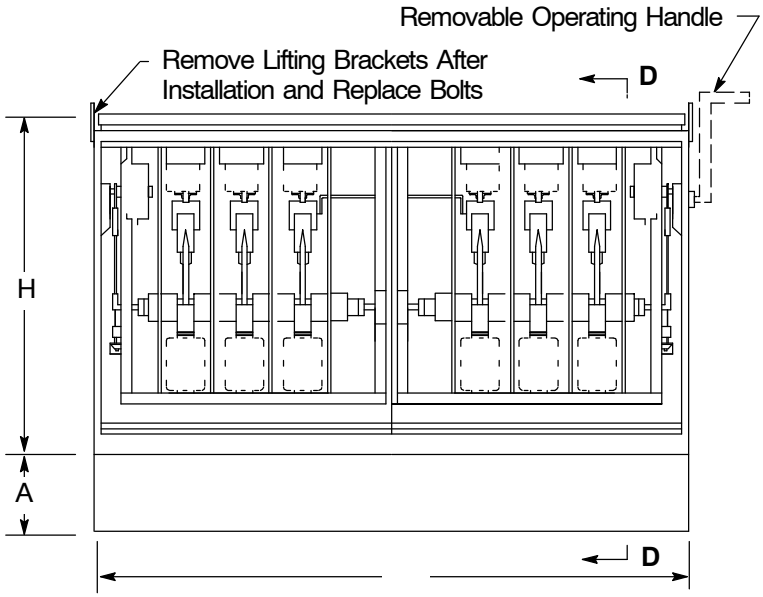
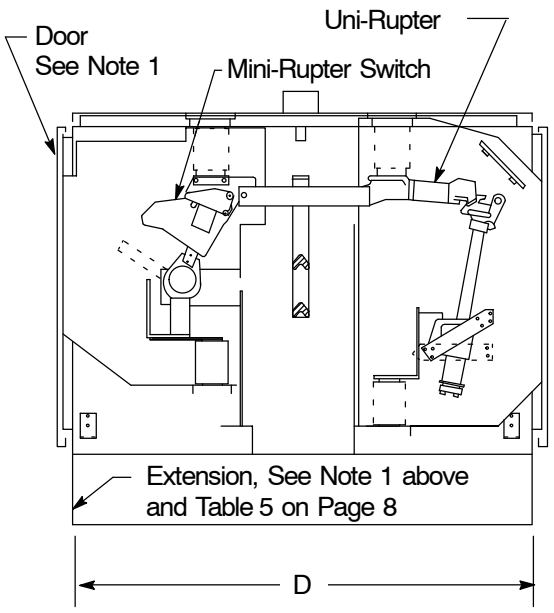
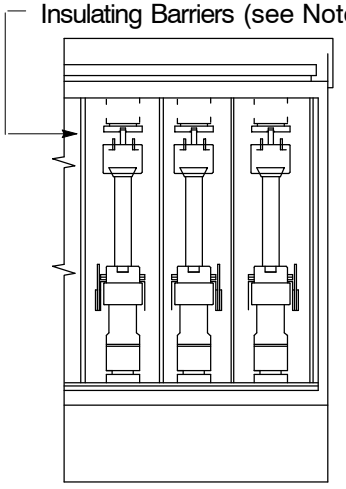


Figure 4
Front View
PMH-6 Illustrated (doors removed)



Section D-D



Detail D
Rear View – PMH-6Illustrated

Table 4 Data for Types PMH-5 and PMH-6, PMH-9, and PMH-11

Type	Rating kV	A[1]	D	H	W
		Inches			
PMH-5	14.4	–	51-3/4	44	37-7/8
	25	–	66-1/4	55	43
PMH-3, PMH-9, PMH-11	14.4	–	60-3/4	44	67
	25	–	76-3/4	55	82

[1] See Table 5 on Page 8 for base extension sizes.

Pad-Mounted, Load-Break Switches and Fuses

Types PMH-5, PMH-6, PMH-9, and PMH-11 (continued)

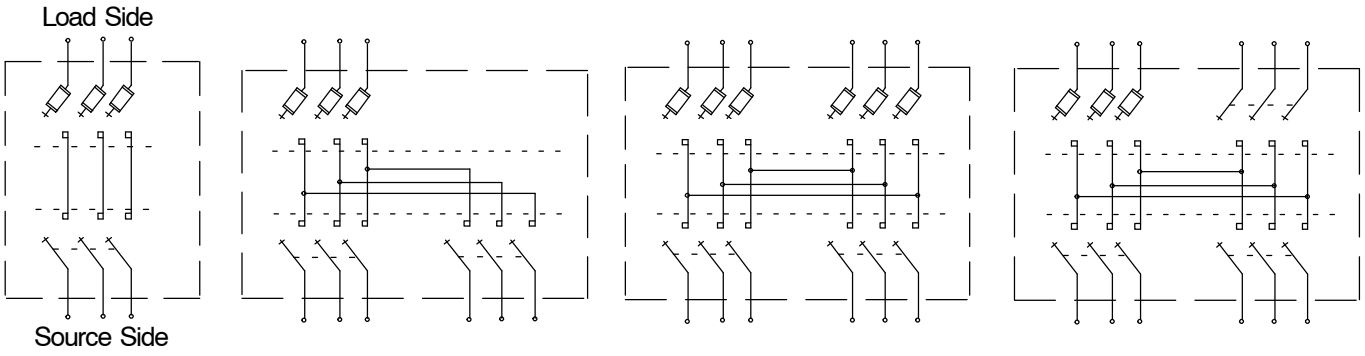


Diagram C
PMH–5

Diagram D
PMH-6

Diagram E
PMH-9

Diagram F
PMH-11

Table 5 Data and Codes for Types PMH-5, PMH-6, PMH-9, and PMH-11

Ratings			Diagram	Type	Ext. Size (in.)	Code [1]	Weight (lbs.) (approximate)
Voltage kV (maximum)	Amps					600-Amp [2]	
	Switch[3] (maximum cont.)	Fuse (maximum size)					
14.4 [4]	600	200E	C	PMH-5	18	342750	1,100
	600	200E	D	PMH-6	18	342751	1,750
	600	200E	E	PMH-9	18	342752	2,255
	600	200E	F	PMH-11	18	037237	1,625
25 [5]	600	200E	C	PMH-5	12	342753	1,375
	600	200E	D	PMH-6	12	342754	2,200
	600	200E	E	PMH-9	12	342755	2,835
	600	200E	F	PMH-11	12	037080	2,175

1 Code number includes the base extension shown in this table.
2 600-amp continuous rating, 600-amp loop or parallel switching rating, and 600-amp load dropping rating.
3 The emergency rating for 8 hours or less is 725 amperes.
4 Asymmetrical rating for momentary and fault-closing is 22,000 A.
5 Asymmetrical rating for momentary and fault-closing is 22,000 A.

Concrete Pad Details and Material Requirements

Notes

1. A splice and/or pull box (see Document 062000) should be positioned adjacent to the pad when necessary to facilitate cable termination (see Figure 6).
2. A 6-foot minimum separation shall be maintained between ground rods.
3. The concrete pads shown on this drawing are available pre-cast. Pre-cast pad installations should use the available windows (or i" knockouts, if present) to install ground rods and route ground wires.
4. See Page 11 for PMH-11 pad.
5. For 2-inch and 3-inch conduits, use conduit bends with a minimum 36-inch sweep.

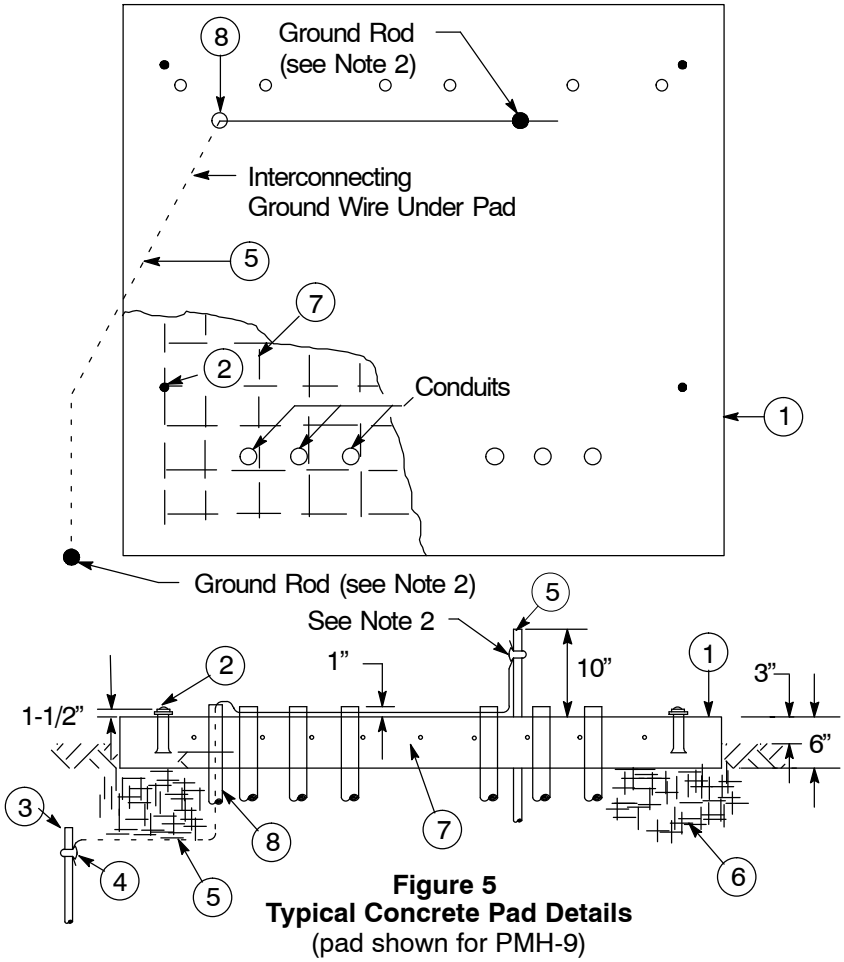
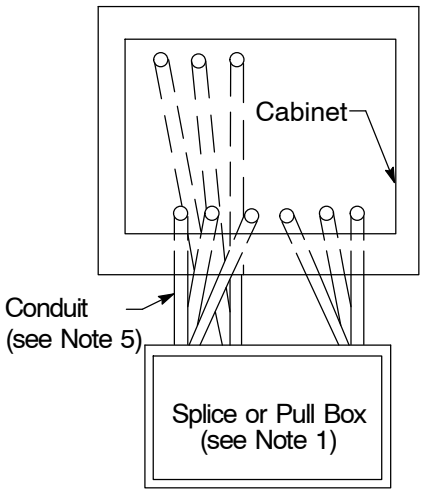


Figure 5
Typical Concrete Pad Details
(pad shown for PMH-9)



(PG&E engineer will provide conduit layout when necessary)

Figure 6
Splice or Pull Box Location

Table 6 List of Material Typical Concrete Pad

Item	Quantity	Description	Code	Document
1 [1]	1	Concrete Pad (see Table 7 on Page 12 for dimension and codes)	–	–
2	4	Anchor Bolt, 1/2" x 3-1/2"	190445	–
3	2	Ground Rod, 5/8" x 8' 0", Hubbard Cat. #9438 or Equivalent	187013	013109
4	2	Clamp, Ground Rod, for Item 3	187012	
5	As Reqd.	Wire, Ground, #2 AWG Minimum, Bare Copper	–	–
6	As Reqd.	Sand	–	–
7	As Reqd.	Wire Mesh, 6" x 6" - 4/4 or Equivalent (pour in place only)	–	–
8	1	Conduit, 1" x 8" Length	–	062288

[1] Concrete shall have a minimum strength of 2,500 pounds per square inch in 28 days.

Concrete Pad Dimensions and Conduit Arrangements

Note

1. Figure 7, Figure 8, Figure 9, and Figure 10 on Page 10, and Figure 11 on Page 11 depict the 14.4 kV units. The 25 kV units have different proportions. Use the exact dimensions from Table 7 on Page 12 for all the voltages.

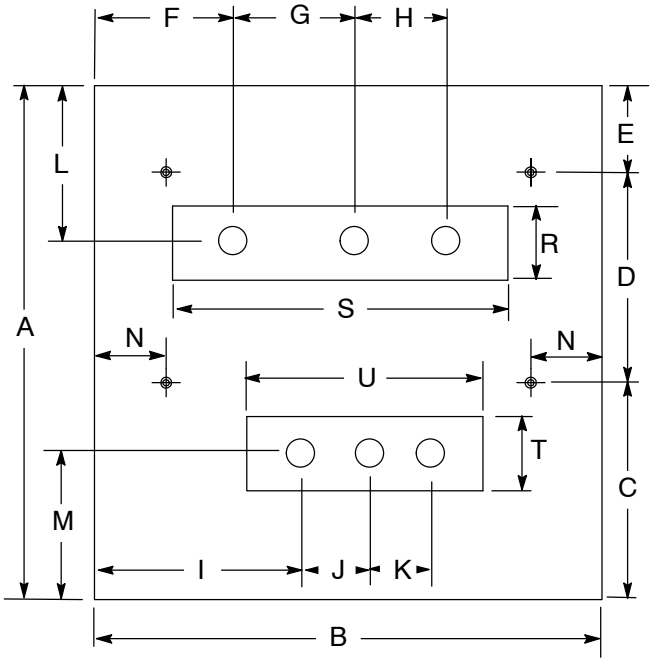


Figure 7
PMH-3 & 5

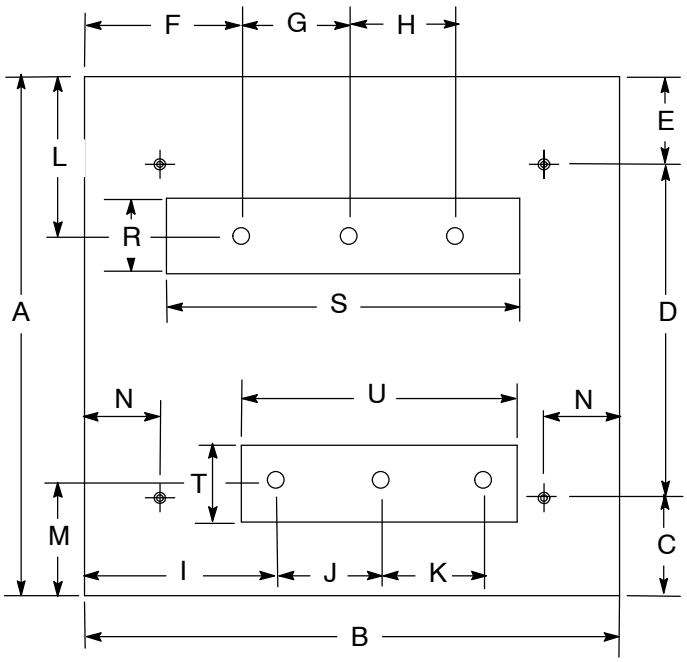


Figure 8
PMH-4

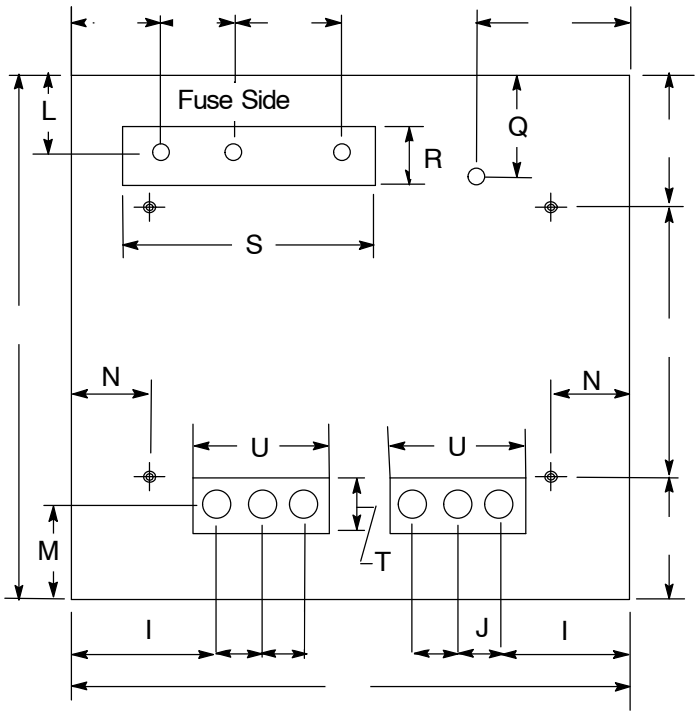


Figure 9
PMH-6

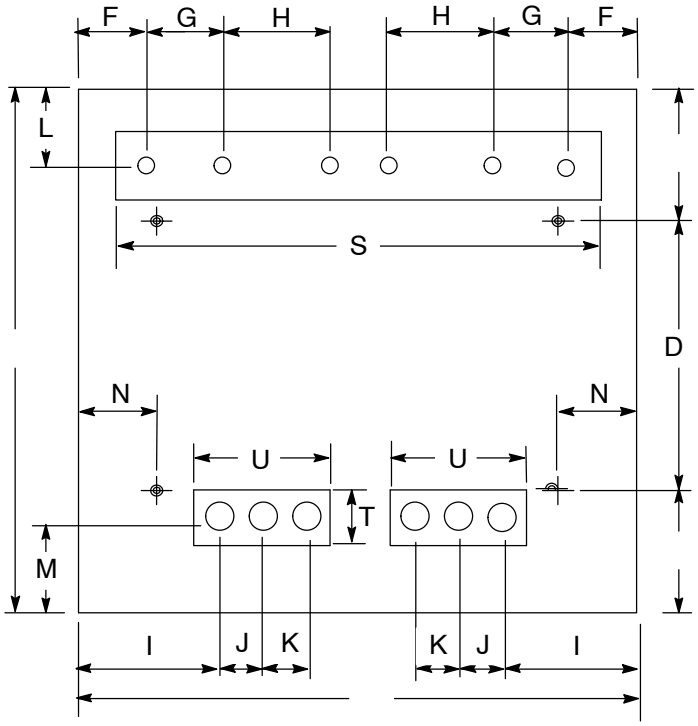


Figure 10
PMH-9

Concrete Pad Dimensions and Conduit Arrangements (continued)

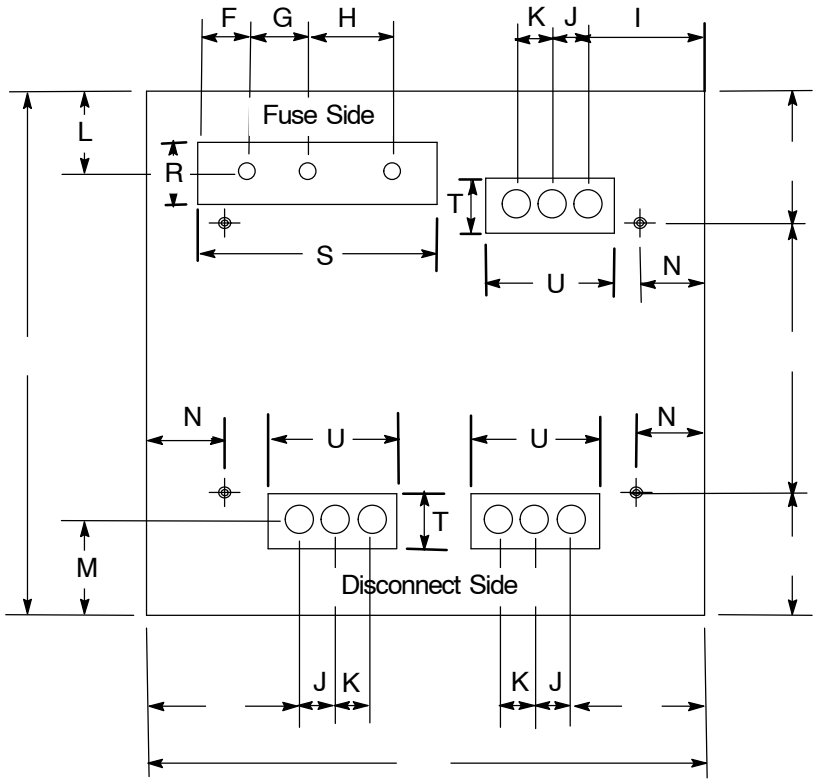


Figure 11
PMH-11

Pad-Mounted, Load-Break Switches and Fuses

Table 7 Concrete Pad Dimensions

Pad-Mounted, Load-Break Switches		Figure	Dimensions (inches)								Material Code
			A	B	C	D	E	F	G	H	
14.4 kV	PMH-3	7	41-1/2	40-7/8	17-1/2	17	7	10-3/4	9-3/4	9-3/4	040974
	PMH-4	8	41-1/2	40-7/8	7	27-1/2	7	10-1/2	9-3/4	9-3/4	040977 [1]
	PMH-5	7	55-1/2	40-7/8	17-1/2	31	7	7-7/8	9-3/4	9-3/4	040978
	PMH-6	9	64-1/2	73	17-1/2	40	7	7-3/4	9-3/4	14-3/4	040982
	PMH-9	10	64-1/2	73	17-1/2	40	7	7-3/4	9-3/4	14-3/4	040984
	PMH-11	11	64-1/2	73	17-1/2	40	7	7-3/4	9-3/4	14-3/4	040993
25 kV	PMH-3	7	60-1/2	49	9	42-1/2	9	12-5/8	10	12-1/2	040994
	PMH-4	8	60-1/2	49	9	42-1/2	9	12-1/4	10	12-1/2	040995 [1]
	PMH-5	7	69	49	9	51	9	9-5/8	12-1/2	12-1/2	041001
	PMH-6	9	80-1/2	88	9	62-1/2	9	9	12-1/2	16-1/2	041002
	PMH-9	10	80-1/2	88	9	62-1/2	9	9	12-1/2	16-1/2	041003
	PMH-11	11	80-1/2	88	9	62-1/2	9	9	12-1/2	16-1/2	041004
Pad-Mounted, Load-Break Switches		Figure	I	J	K	L	M	N	P	Q	Weight (approx.)
14.4 kV	PMH-3	7	15-7/8	6	6	13	11-3/4	5-3/4	–	–	750
	PMH-4	8	13-1/2	9-3/4	9-3/4	13	8-7/8	5-3/4	–	–	725
	PMH-5	7	15-7/8	6	6	8-7/8	11-3/4	5-3/4	–	–	1,150
	PMH-6	9	15-7/8	6	6	8-7/8	11-3/4	5-3/4	24-1/2	13-1/4	2,400
	PMH-9	10	15-7/8	6	6	8-7/8	11-3/4	5-3/4	–	–	2,150
	PMH-11	11	15-7/8	6	6	8-7/8	12-3/4	5-3/4	–	–	2,475
25 kV	PMH-3	7	16-3/4	7-1/2	7-1/2	17-1/8	16	5-3/4	–	–	1,700
	PMH-4	8	14-1/2	12-1/2	12-1/2	17-1/8	13-1/8	5-3/4	–	–	1,500
	PMH-5	7	16-3/4	7-1/2	7-1/2	13-1/8	16	5-3/4	–	–	1,630
	PMH-6	9	16-3/4	7-1/2	7-1/2	13-1/8	16	5-3/4	30	16-3/4	3,650
	PMH-9	10	16-3/4	7-1/2	7-1/2	13-1/8	16	5-3/4	–	–	3,400
	PMH-11	11	16-3/4	7-1/2	7-1/2	13-1/8	16	5-3/4	–	–	3,650
Pad-Mounted, Load-Break Switches		Figure	R	S	T	U					
14.4 kV	PMH-3	7	6	27	6	19					
	PMH-4	8	6	27	6	24					
	PMH-5	7	6	26	6	19					
	PMH-6	9	6	30	6	18					
	PMH-9	10	8	63	6	18					
	PMH-11	11	6	30	6	18					
25 kV	PMH-3	7	6	28-1/4	6	21					
	PMH-4	8	6	28-1/4	6	31					
	PMH-5	7	6	31	6	21					
	PMH-6	9	6	35	6	21					
	PMH-9	10	6	74	6	21					
	PMH-11	11	6	35	6	21					

[1] The PMH-4 is no longer available for purchase, thus the PMH-4 precast pad is no longer available to purchase.

Revision Notes

Revision 20 has the following changes:

1. Updated images of flat-pads to match pre-cast pads with window openings on Figures 8 through 10 on page 10 and Figure 11 on Page 11.
2. Noted that the PMH-4 pre-cast pad should no longer be purchased in Table 7, Footnote 1, on Page 12.
3. Corrected weights of flat pads in Table 7.
4. Added dimensions information for flat pad windows in Table 7.
5. Corrected Note 3 on Page 1 to reference the PMH Remote Operating Tool.
6. Remove mention of Federal Pacific (EEI) PMH's.