Installation and Adjustment

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September 16, 2019

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 non live 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 your Type SML-20 Power Fuses. Familiarize yourself with the Safety Information and Safety Precautions on pages 4 through 5. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/**.

Retain this Instruction Sheet

This instruction sheet should be available for reference whenever Type SML-20 Power Fuses are used. Retain this instruction sheet in a location where you can easily retrieve and refer to it.

Proper Application

⚠ WARNING

Type SML-20 Power Fuses must only be used for specific fusing applications that are within the ratings of the model selected. Type SML-20 Power Fuses ratings are listed on a ratings label attached to the unit.

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 Qualification

For the standard warranty contained in the seller's standard conditions of sale (as set forth in Price Sheet 150) to apply, S&C Type SML-20 Back-Connected Disconnect Style Live Parts must be installed in accordance with the instructions found in this publication. Furthermore, when installed in indoor, outdoor, or indoor-outdoor enclosures of other than S&C manufacture, the enclosures must be constructed in accordance with S&C's applicable minimum construction specifications to be found in the current version of the following publication:

INFORMATION BULLETIN 252-301:

S&C Type SML Power Fuses Indoor Distribution (13.8 kV and 25 kV)	Minimum Construction Specifications for Indoor and Outdoor Metal Enclosures with Back-Connected Disconnect Style Live Parts

With respect to S&C Type SML-20 Power Fuse Back-Connected Disconnect Style Llve Parts when installed in submersible enclosures of other than S&C manufacture, the warranty does not apply unless enclosures are furnished by an approved supplier and are of watertight construction providing proper electrical clearances and proper space for fuse handling.

The standard warranty contained in the seller's standard conditions of sale (as set forth in Price Sheet 150) does not apply when fuses of other than S&C manufacture are used with S&C Type SML-20 Back-Connected Disconnect Style Live Parts or when S&C holders, refill units, or fuse units are used in mountings of other than S&C manufacture.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to your Type SML-20 Power Fuses. Familiarize yourself 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 you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **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 your Type SML-20 Power Fuses.

Replacement Instructions and Labels

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

⚠ DANGER

Type SML-20 Power Fuses contain high voltage. Failure to observe the precautions below will result in serious personal injury or death.

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

1. **QUALIFIED PERSONS.** Access to Type SML-20 Power Fuses 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.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, arc-flash clothing, and fall-protection, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels and tags. Remove tags ONLY if instructed to do so.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
6. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
7. **Do not remove the fuse unit from its carton until ready to use.**
8. **Handle fuse units with care.** Do not drop or throw or throw them.
9. **Do not place hand over the upper seal of the fuse unit when handling.** There is the remote possibility that the current-responsive section of the fuse unit may have been weakened in shipping or handling. As a result, the spring-loaded actuating pin may be unpredictably released and driven forcibly through the upper seal.

S&C Power Fuses with Uni-Rupter® Interrupters are designed for the following single-pole live-switching duties in single-phase or three-phase circuits of distribution systems rated 14.4 kV or 25 kV:

Live Switching—Opening

- **Transformer switching—**Transformer load currents up through 200 amperes as well as transformer magnetizing currents associated with the applicable loads
- **Line switching—**Load splitting (parallel or loop switching) and load dropping of currents up through 200 amperes; also line dropping (charging currents typical for distribution systems of these voltage ratings)
- **Cable switching—**Load splitting (parallel or loop switching) and load dropping of currents up through 200 amperes; also cable dropping (charging currents typical for distribution systems of these voltage ratings)

Live Switching—Closing

- **Circuit closing—**Inrush currents associated with the above opening duties
- **Duty-cycle● fault closing—**One-time capability equal to the interrupting rating of the fuse (in amperes RMS asymmetrical, 22,400 at both 14.4 kV and 25 kV) and two-time capability of 13,000 amperes RMS asymmetrical at 14.4 kV and 25 kV

● These values represent the fault-closing capabilities of the fuse with a Uni-Rupter Interrupter when the fuse is closed with a purposeful thrust without hesitation. The values are the available fault currents into which the fuse can be closed the specified number of times (once or twice), with the Uni-Rupter Interrupter remaining operable and able to carry and interrupt rated current.

A Note on Single-Pole Switching

In single-pole switching of ungrounded-primary three-phase transformers or banks (or single-phase transformers connected line to line), circuit connections or parameters may, in some cases, produce excessive overvoltages. In particular, for the following applications above 22 kV, single-pole switching by any means, including with a Uni-Rupter Interrupter, should be performed only under the conditions stated in italics:

- Switching unloaded or lightly loaded delta-connected or ungrounded-primary wye-wye connected three-phase transformers or banks (or line-to-line connected singlephase transformers), rated 150 kVA or less three-phase, or 50 kVA or less single-phase, or of any kVA rating when combined with unloaded cables or lines where maximum system operating voltage exceeds 22 kV (*Single-pole switching should be performed only if each phase is carrying 5% load or more or if the transformer or bank is temporarily grounded at the primary neutral during switching.)*
- Switching loaded or unloaded ungrounded-primary wye-delta connected three-phase transformers or banks —alone or combined with unloaded cables or lines— where maximum system operating voltage exceeds 22 kV (*Single-pole switching should be performed only if each phase is carrying 5% load or more and if the lighting-load phase is always switched open first (or switched closed last) or if the transformer or bank is temporarily grounded at the primary neutral during switching.)*

These live parts can be mounted as shown in Figure 1 on page 9 or Figure 3 on page 11.

Note: Because operation of Uni-Rupter Interrupters requires pull-out forces between 50 and 80 lbs. be applied to the fuse-unit pull-ring during opening, the live-part support structure must be sufficiently rigid to resist such forces without deflection.

Back-supported hinge-and-lower-contact assembly mounting configuration (see Figure 1 on page 9:

STEP 1. Install insulators (not included with live parts) in the locations shown in Figure 1 on page 9, with the mounting bolts snug but loose enough to permit later adjustments.

Note: Slotted mounting holes should be provided in the supporting structure to permit side-to-side adjustment of the upper insulator, and vertical adjustment of the lower insulator.

STEP 2. Attach the Uni-Rupter Interrupter to the upper insulator as shown in Figure 1 on page 9, using two ⅜-inch galvanized bolts with lockwashers (not furnished). Fully tighten both Uni-Rupter Interrupter mounting bolts.

STEP 3. Attach the hinge-and-lower-contact assembly to the lower insulator as shown in Figure 1 on page 9, using two ⅜-inch galvanized bolts with lockwashers and flat washers (not furnished). Fully tighten both of the hinge-and-lower-contact assembly mounting bolts.

Note: The hinge-and-lower-contact assembly features two sets of mounting holes/slots to accommodate insulators with either 2-inch (51-mm) or 2¼-inch (57-mm) bolt circles (see Hinge Detail, Figure 1 on page 9). Either set of mounting holes/slots can be used, provided Dimensions "P" and "S" are maintained, as shown in Figure 1 on page 9.

STEP 4. Make sure the centerline of the Uni-Rupter Interrupter and the centerline of the hinge-and-lower-contact assembly are parallel and aligned to within 1/16-inch (1.6 mm) as shown in Figure 1 on page 9 (Front View). Move the upper insulator (with the Uni-Rupter Interrupter attached) from side to side as required to obtain proper alignment. Then, fully tighten both upper-insulator mounting bolts.

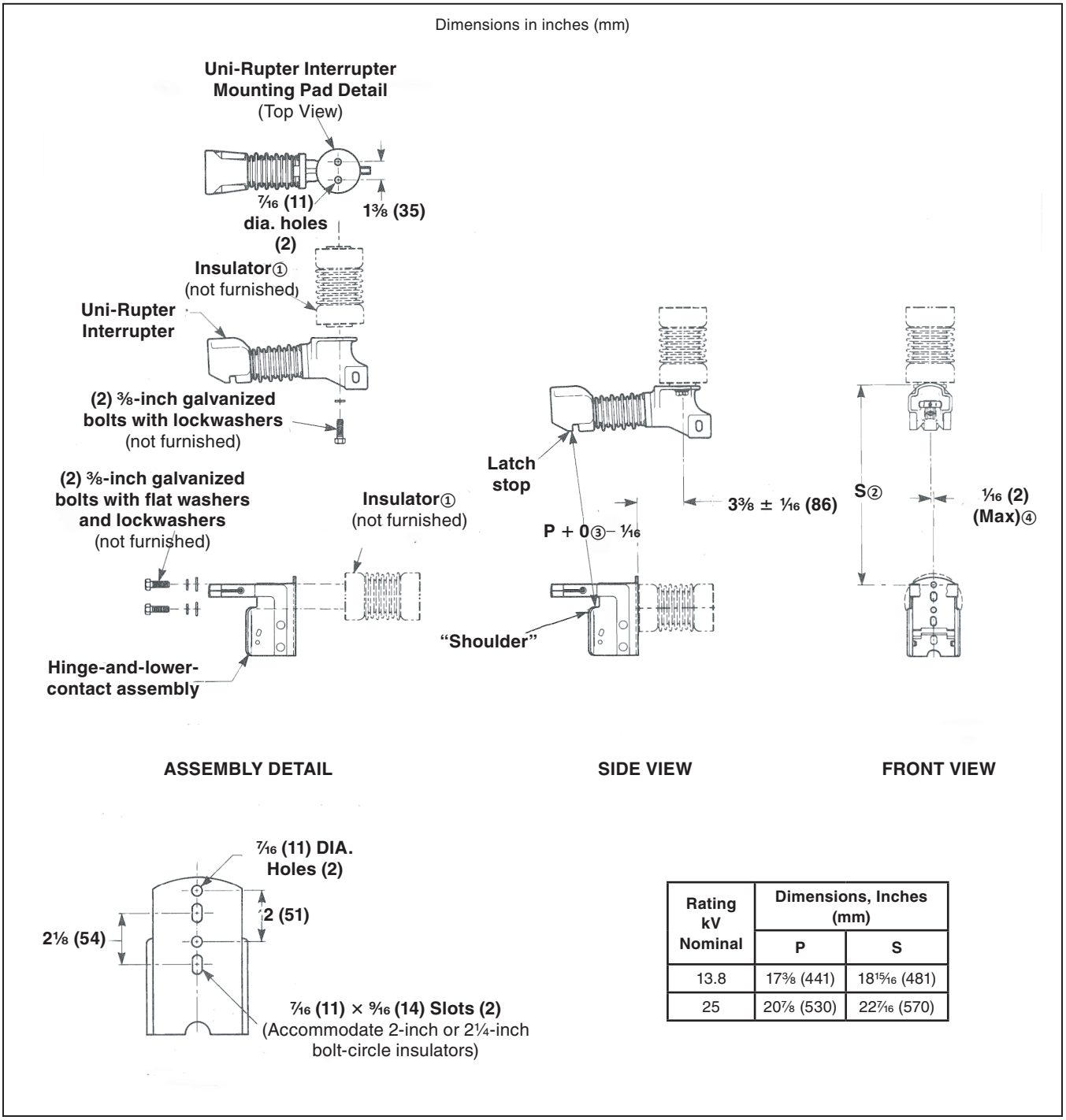
STEP 5. Accurately measure the distance from the lower edge of the latch stop on the Uni-Rupter Interrupter to the "shoulder" on the hinge-and-lower-contact assembly (Dimension "P") as shown in Figure 1 on page 9. Move the lower insulator toward or away from the Uni-Rupter Interrupter as required to bring this dimension within the specified tolerance for Dimension "P." Make sure Dimension "P" is maintained on both sides of the Uni-Rupter Interrupter and the hinge-and-lower-contact assembly and also that the Uni-Rupter Interrupter and the hinge-and-lower-contact assembly are still properly aligned as described in Step 4. Then, fully tighten both lower-insulator mounting bolts.

Proceed to the "Final Operational Checks" section on page 12.

Bottom-supported hinge-and-lower-contact assembly mounting configuration (see Figure 3 on page 11):

STEP 1. Install insulators (not included with live parts) in the locations shown in Figure 3 on page 11, with the upper-insulator mounting bolts snug but loose enough to permit later adjustments. Fully tighten the mounting bolts securing the lower insulator to the structure.

Note: Slotted mounting holes should be provided in the supporting structure to permit side-to-side adjustment of the upper insulator.



Rating kV Nominal	Dimensions, Inches (mm)	
	P	S
13.8	17 3/8 (441)	18 15/16 (481)
25	20 7/8 (530)	22 7/16 (570)

Figure 1. Mounting configuration utilizing back-supported hinge-and-lower-contact assembly.

① Support insulators are available from S&C. To order, specify catalog number PA-7181 (13.8 kV) or PA-7183 (25 kV), as applicable.

② Dimension "S" is to be measured from the mounting surface of a Uni-Rupter Interrupter to the center of the uppermost mounting hole in the hinge-and-lower-contact assembly. This is a reference dimension, for preliminary positioning of insulators only. Dimension "P" described in Note③ is a critical-adjustment dimension.

③ Dimension "P" must be maintained on both sides of a Uni-Rupter Interrupter and the hinge and-lower-contact assembly to ensure correct latch engagement and proper operation of a Uni-Rupter Interrupter.

④ The centerlines of a Uni-Rupter Interrupter and the hinge-and-lower-contact assembly must be parallel and aligned to within 1/16-inch (2 mm) as shown.

STEP 2. Attach the Uni-Rupter Interrupter to the upper insulator, as shown in Figure 3 on page 11, using two ⅜-inch galvanized bolts with lockwashers (not furnished). Fully tighten both the Uni-Rupter Interrupter mounting bolts.

STEP 3. Attach a hinge-and-lower-contact assembly support bracket (not furnished) to the lower insulator using two ⅜-inch galvanized bolts with lockwashers, as shown in Figure 3 on page 11. Fully tighten the mounting bolts securing the support bracket to its insulator.

Note: Design specifications for a support bracket are provided in Figure 2.

STEP 4. Attach the hinge-and-lower-contact assembly to the support bracket, as shown in Figure 3 on page 11, using two ⅜-inch galvanized bolts with flat washers, lockwashers, and nuts (not furnished). The mounting bolts securing the hinge-and-lower-contact assembly to the support bracket should be snug but loose enough to permit later adjustments.

Note: The hinge-and-lower-contact assembly features two sets of mounting holes/slots (see Hinge Detail, Figure 3 on page 11). Either set of mounting holes/slots can be used provided Dimensions "P" and "S" are maintained as shown in Figure 3 on page 11.

STEP 5. Make sure the centerline of the Uni-Rupter Interrupter and the centerline of the hinge-and-lower-contact assembly are parallel and aligned to within 1/16-inch (2 mm) as shown in Figure 3 on page 11 (Front View). Move the upper insulator (with the Uni-Rupter Interrupter attached) from side to side as required to obtain proper alignment. Then, fully tighten both upper-insulator mounting bolts.

STEP 6. Accurately measure the distance from the lower edge of the latch stop on the Uni-Rupter Interrupter to the "shoulder" on the hinge-and-lower-contact assembly (Dimension "P") as shown in Figure 3 on page 11. Move the hinge-and-lower-contact assembly toward or away from the Uni-Rupter Interrupter as required to bring this dimension within the specified tolerance for Dimension "P." Make sure Dimension "P" is maintained on both sides of the Uni-Rupter Interrupter and the hinge-and-lower-contact assembly and that the Uni-Rupter Interrupter and the hinge-and-lower-contact assembly still properly aligned as described in Step 5. Then, fully tighten both hinge-and-lower-contact assembly mounting bolts.

Proceed to the "Final Operational Checks" section on page 12.

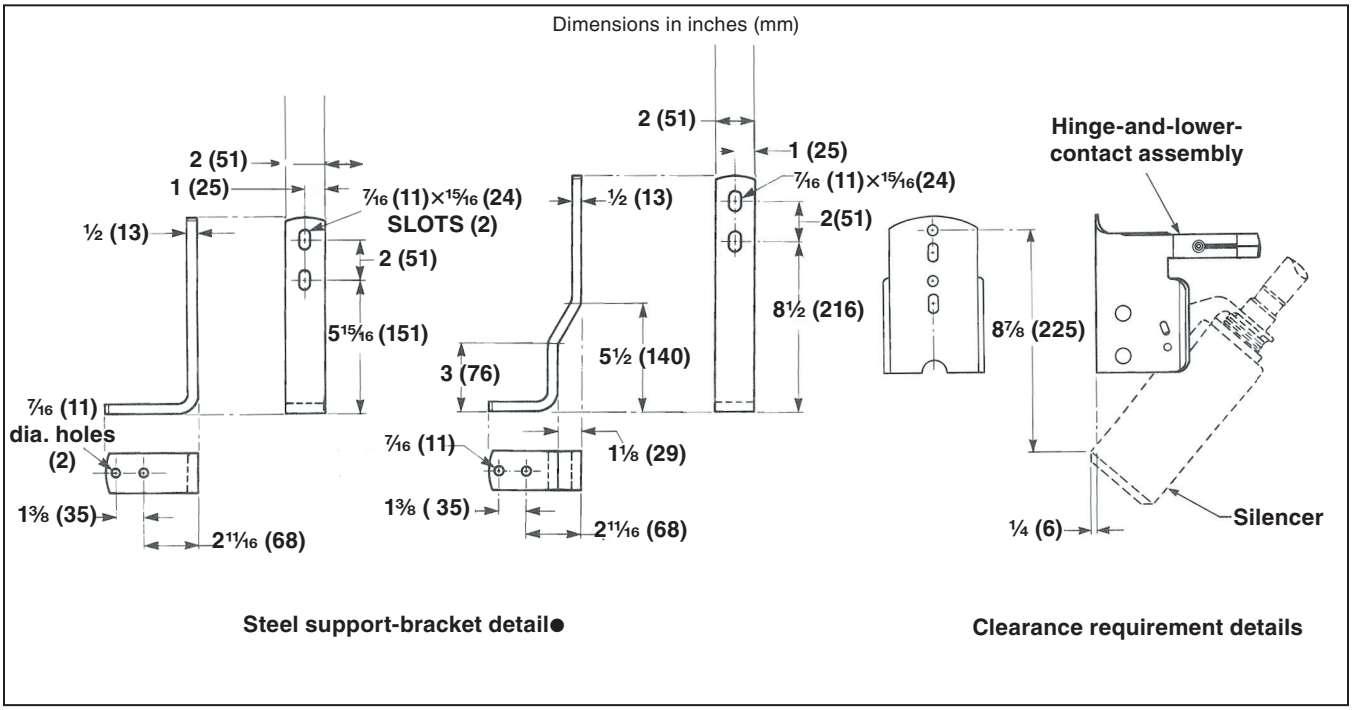
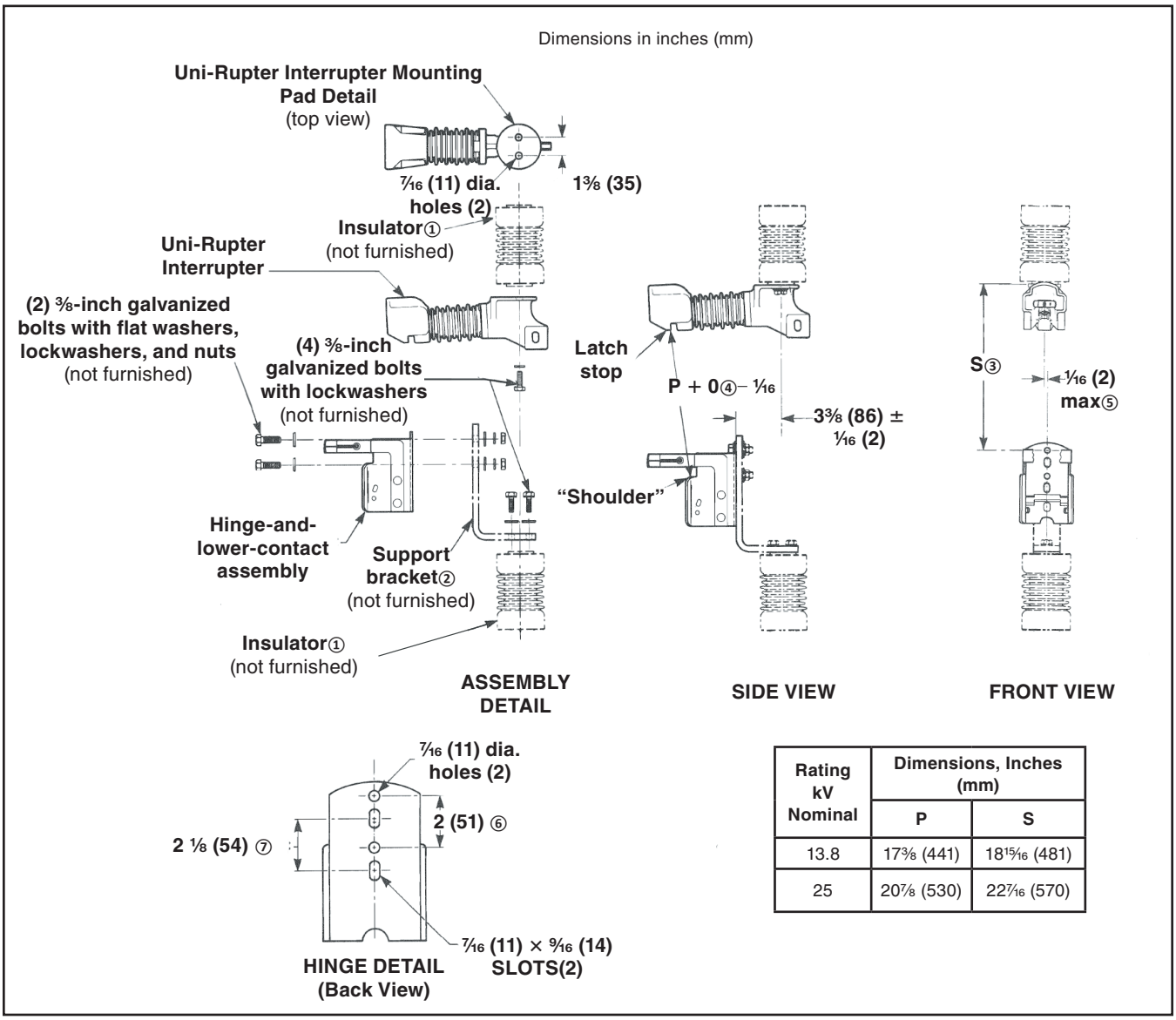


Figure 2. Dimensions for mounting live parts for SM-20 Power Fuses.

● A support bracket not conforming to the applicable design shown must provide equivalent rigidity and also sufficient clearance to accommodate silencer, without interference, with a the fuse in the fully **Open** position (see Clearance requirement details).



Rating kV Nominal	Dimensions, Inches (mm)	
	P	S
13.8	17 3/8 (441)	18 15/16 (481)
25	20 7/8 (530)	22 7/16 (570)

Figure 3. Mounting configuration using bottom-supported hinge-and-lower-contact assembly.

① Support insulators are available from S&C. To order, specify catalog number PA-7181 (13.8 kV) or PA-7183 (25 kV), as applicable.

② Support bracket is available from S&C. To order, specify catalog number S-83910 (13.8 kV) or S-83911 (25 kV), as applicable.

③ Dimension "S" is to be measured from the mounting surface of a Uni-Rupter Interrupter to the center of the uppermost mounting hole in the hinge-and-lower-contact assembly. This is a reference dimension, for preliminary positioning of insulators only. Dimension "P" described in Note ④ is a critical-adjustment dimension.

④ Dimension "P" must be maintained on both sides of a Uni-Rupter Interrupter and the hinge-and-lower-contact assembly to ensure correct latch engagement and proper operation of a Uni-Rupter Interrupter.

⑤ The centerlines of a Uni-Rupter Interrupter and the hinge-and-lower-contact assembly must be parallel and aligned to within 1/16-inch (2 mm) as shown.

⑥ These round mounting holes must be used when employing the S&C support bracket (or one reflecting S&C's design specifications) for live parts rated 13.8 kV.

⑦ These slotted mounting holes must be used when employing the S&C support bracket (or one reflecting S&C's design specifications) for live parts rated 25 kV.

Install an SMU-20® Fuse Unit (with end fittings, including silencer, attached as directed in S&C Instruction Sheet 252-550) in the hinge-and-lower-contact assembly and slowly close the fuse-unit assembly into the Uni-Rupter Interrupter. Make sure the contact rod on the fuse-unit upper end fitting makes an "on center" approach to the fault-closing contact on the Uni-Rupter Interrupter (without operator manipulation or guidance), as shown in Figure 4, and that not more than 1/16-inch (2-mm) clearance exists between the latch stop on the Uni-Rupter Interrupter and the latch on the fuse-unit upper end fitting (with the fuse latched and in the **Closed** position) as shown in Figure 5. If adjustment is required, repeat the alignment procedures described earlier in the "Installation and Adjustment" section on pages 8 through 11 until proper adjustment is achieved.

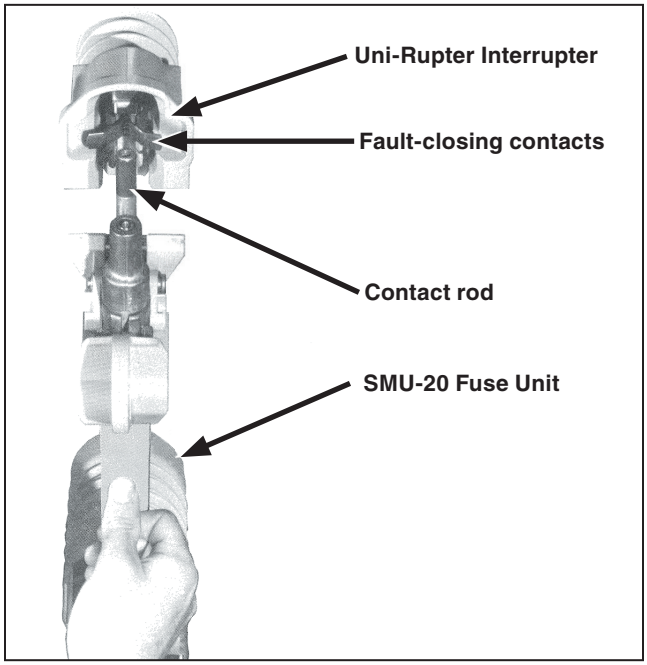


Figure 4. "On center" approach of contact rod to fault-closing contacts of the Uni-Rupter Interrupter.

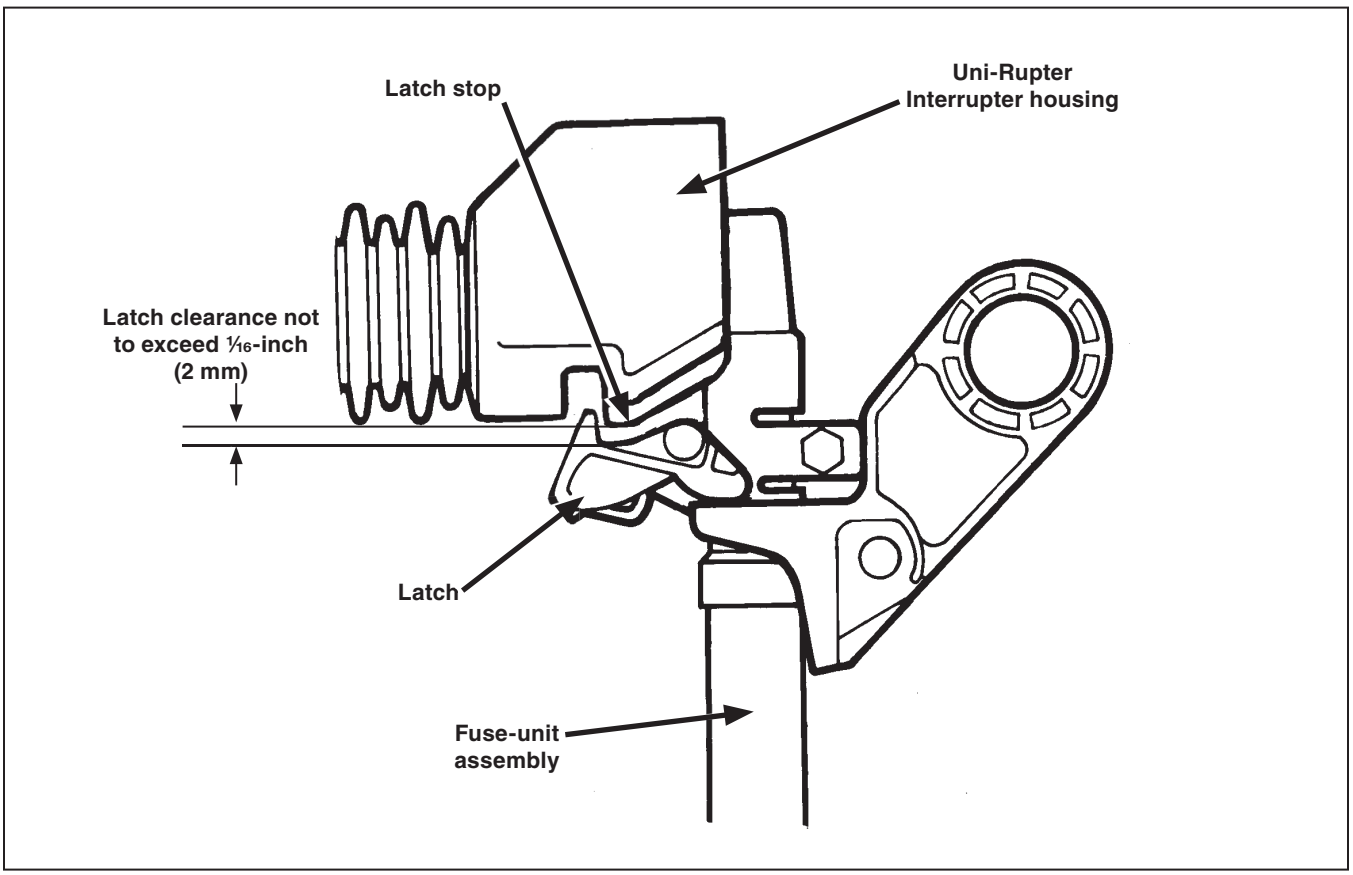


Figure 5. Proper latch engagement.