

# INSTRUCTIONS

## For Operation

### INTRODUCTION

**CAUTION:** The equipment covered by this publication must be operated and maintained by qualified persons who are thoroughly trained and who understand any 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.

### General

These instructions are for operation of S&C Type SM-20 Power Fuses, in ratings of 13.8 kv, 25 kv, and 34.5 kv, and are applicable to installations featuring complete SM-20 Mountings, as well as to installations featuring separately purchased SM-20 Live Parts.\*

### Construction and Performance

S&C Type SM-20 Power Fuses feature fuse-unit end fittings including Silencer—S&C's exhaust control device that virtually eliminates venting, and an SMU-20 Fuse Unit which is replaced after the fuse operates. A specially designed hinge provides self-guiding action for the fuse unit during opening or closing. (See Figure 1).

\* These recommendations may differ from the user's operating and safety procedures. Where a discrepancy exists, users should follow their procedures.

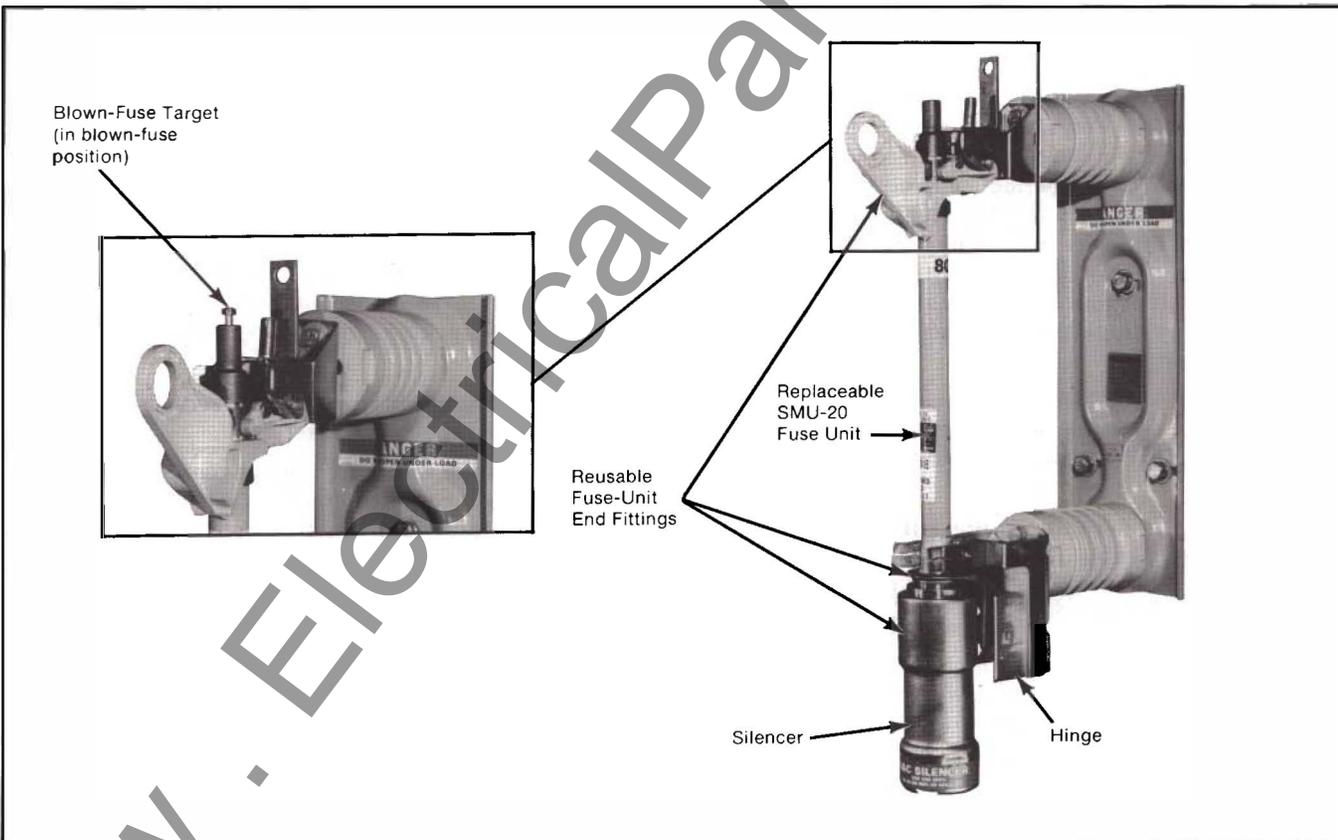


Figure 1. S&C Type SM-20 Power Fuse.

Supersedes Instruction Sheet 252-536 dated 2-16-81 © 1982

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## S&C Power Fuses — Type SM-20

Indoor Distribution (13.8 kv through 34.5 kv)

### INTRODUCTION

The upper end fitting features a brilliant-red blown-fuse target which projects from the top of the upper end fitting when the fuse unit has operated. . . making it easy to check the fuse condition with the fuse in the closed position. The blown-fuse target retracts within the end fitting when the blown fuse unit is replaced. **NOTE ON HANDLING:** The current-design upper end fitting for use in SM-20 Power Fuses employs a free-floating blown-fuse target which can move (by force of gravity) into the "blown-fuse" position should the fuse unit be inverted during handling. Fuse condition can be verified by returning the fuse unit to the upright position. If the fuse unit is blown, the target will remain in the extended (projecting) position.

SMU-20 Fuse Units are expendable and inexpensive; they are the only item that needs to be replaced after a fuse operation, thus minimizing fuse replacement costs. The fuse unit consists essentially of a fusible element, an arcing rod, and a solid-material arc-extinguishing medium contained within a filament-wound glass-epoxy tube. SMU-20 Fuse Units are offered in four time-current characteristics: the S&C "K" Speed, S&C Standard Speed, S&C Slow Speed, and S&C Very Slow Speed. These fuse units are available in ratings through 200K or 200E amperes.

Note: These power fuses are not designed for live-switching duties.

### CAUTION

Type SM-20 Power Fuses are intended for use in controlled-access metal-enclosed switchgear or vaults. Cautionary signs indicating the presence of high voltage and the requirement that the gear be operated by qualified persons should be affixed to all access doors and should not be removed, and all such access doors should be locked when left unattended.

Although only qualified persons may operate, inspect, or maintain power switchgear, this should pose no problem to users of S&C Power Fuses. Mechanical maintenance is generally not required. The only "maintenance" recommended is periodic cleaning and inspection of insulators and barriers. Fuse replacement is very infrequent, since fuse operations (blowings) occur on an average of once in 20 years. In addition, qualified persons are available from an electrical contractor experienced in high voltage or (upon prior agreement) from the serving utility.

When access to high-voltage bays or vaults is required for these purposes, it should be restricted to such qualified persons only, who should observe the following procedures:

1. At all times adhere to the prescribed safety rules which are applicable to high-voltage devices.
2. Make certain that any such device is disconnected from all power sources and all control sources before being inspected or serviced.
3. Always assume both sets of power terminals on any device to be energized unless proved otherwise by visual evidence of open-circuit conditions on both terminal ends or by test using appropriate high-voltage test equipment. **SPECIAL NOTE:** All voltage transformers must be disconnected when external voltage is used to test any secondary-side wiring

or devices, to avoid energizing the high-voltage conductors through the voltage transformers. Draw out the voltage transformers completely if drawout type transformers are provided. Otherwise, remove the primary fuses of the voltage transformers and disconnect the secondaries by removing the secondary fuses or by disconnecting the secondary leads.

4. Test for voltage. Qualified persons should be certain that they have, and know how to operate, the correct test equipment for determining the voltage on both sets of power terminals in any circuit breaker, power fuse, or interrupter switch equipment.
5. After the switchgear has been completely disconnected from all sources of power, properly connect grounding leads to both sides of the equipment, that is, to the source- and load-side power terminals or contacts of each phase of the equipment to be maintained.

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

1. Make certain that each switchgear or vault door permitting access to high voltage is closed and latched before energizing the circuit or operating any switching device.
2. Make sure that any grounding switch is opened, or other grounding means removed, before closing the associated interrupter switch(es).
3. Lock interrupter switches in the open or closed position as dictated by circumstances.
4. Be sure that all doors and switch-operating handles are fully locked before leaving the installation site, even momentarily. Observe this procedure even in those cases where the gear is accessible only to qualified persons.

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## FUSING

### Preparatory Procedures

Observing the cautions outlined on page 2, open the interrupter switch associated with the affected fuse(s). If the fuses are not applied in conjunction with an interrupter switch, open and lock the upstream interrupting device, and tag the interrupting device with an appropriate cautionary tag in accordance with established safety practices. Then open the switchgear door to gain access to the fuse(s).

### Installing the Fuse Unit

Complete instructions for insertion of new SMU-20 Fuse Units into their end fittings are described in the instruction sheet furnished with each fuse unit.

### Installing the Fuse in its Mounting

*For SM-20 Power Fuses Rated 13.8 Kv and 25 Kv:*

1. To insert the fuse (i.e., the fuse unit with its end fittings attached) in its hinge, use a universal pole\*

\* A 1½-inch universal pole, at least 6 feet long, is recommended (S&C Catalog Number 4202R2-E, or equivalent).

equipped with an S&C Grappler.† Position the Grappler cone in the fuse pull ring and cradle the fuse tube in the Grappler prongs (see Figure 2).

2. Grasp the universal pole with both hands (approximately 2 feet apart) with one hand at the end of the pole opposite from the Grappler. Lift the fuse and lower it into its hinge. Make sure that the fuse is seated securely in the hinge; then disengage the Grappler from the fuse.

Alternately, the fuse-mounting contacts may be tested for voltage and then grounded by means of grounding leads properly connected to both source- and load-side fuse-mounting contacts, after which the fuse may be inserted into the hinge by hand, using insulating rubber gloves.

3. Use a universal pole equipped with an S&C Grappler to move the fuse to the closed and latched position. Position the Grappler with the prongs downward,

† S&C Catalog Number 4423.

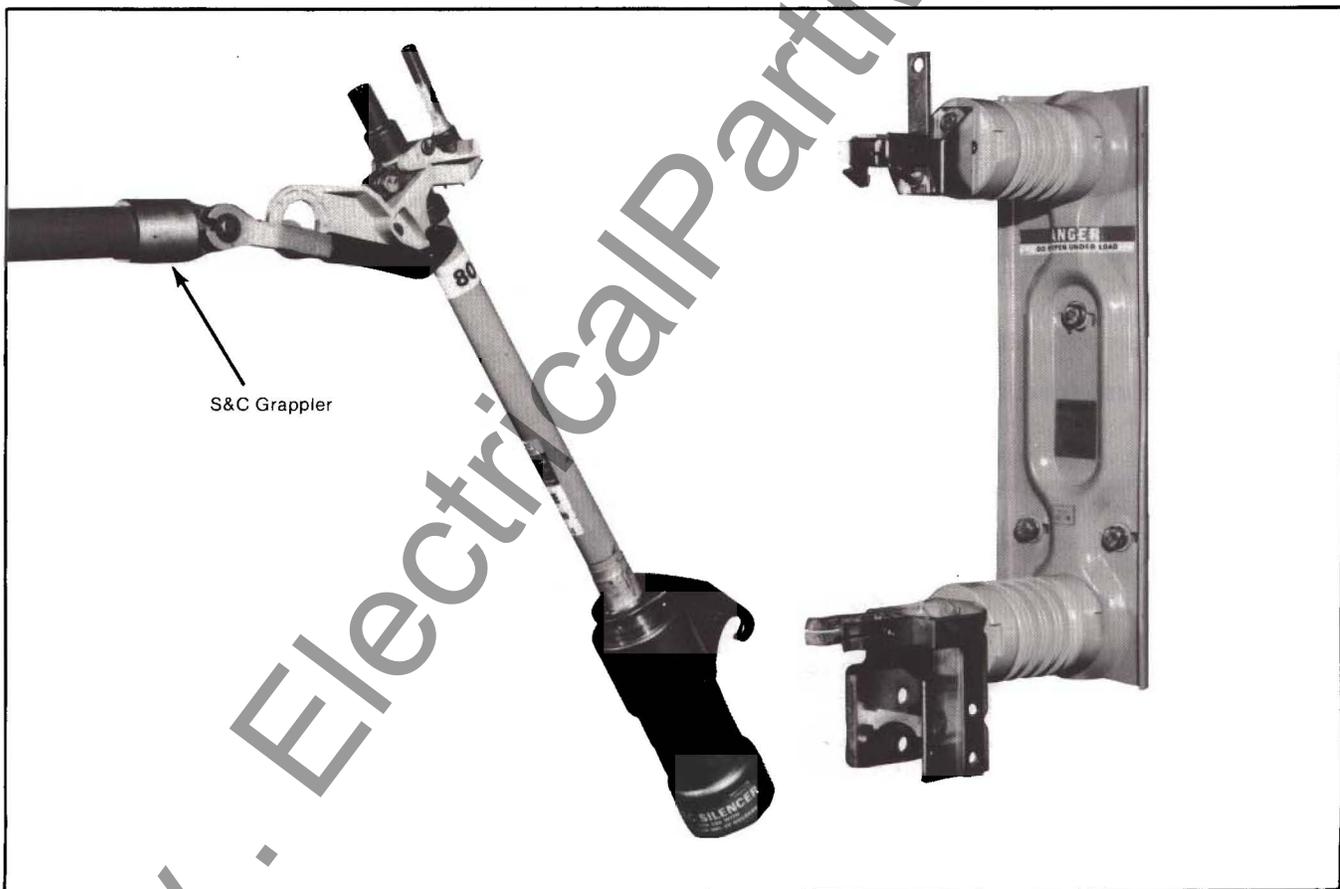


Figure 2. Installing (or removing) fuse using Grappler.

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## FUSING

and insert the longest prong into the pull ring of the fuse.

Remove the temporary grounds (if applicable).

*For SM-20 Power Fuses Rated 34.5 Kv:*

1. Test the fuse-mounting contacts for voltage, then ground the contacts by means of grounding leads properly connected to both source- and load-side con-

tacts. Insert the fuse (i.e., the fuse unit with its end fittings attached) into its hinge by hand, using insulating rubber gloves.

2. Use a universal pole equipped with an S&C Grappler to move the fuse to the closed and latched position. Then remove the temporary grounds.

## RE-FUSING

### Preparatory Procedures

Follow the same procedures as outlined under "Fusing" on page 3.

### How to Detect a Blown Fuse

From a safe distance, observe the blown-fuse target. The upper end fitting features a brilliant-red blown-fuse target which projects from the top of the upper end fitting when the fuse unit has operated. . . making it easy to check the fuse condition with the fuse in the closed position. The blown-fuse target retracts within the end fitting when the blown fuse unit is replaced. **NOTE ON HANDLING:** The current-design upper end fitting for use in SM-20 Power Fuses employs a free-floating blown-fuse target which can move (by force of gravity) into the "blown-fuse" position should the fuse unit be inverted during handling. Fuse condition can be verified by returning the fuse unit to the upright position. If the fuse unit is blown, the target will remain in the extended (projecting) position.

### Removing the Fuse from the Mounting

*For SM-20 Power Fuses Rated 13.8 Kv and 25 Kv:*

1. Use a universal pole equipped with an S&C Grappler to unlatch the fuse. Position the Grappler with the prongs downward, insert the longest prong of the Grappler into the fuse pull ring, and pull outward. Bring the fuse to the fully open position so that the Silencer rests against its stop, and disengage the Grappler.
2. Using the universal pole with the S&C Grappler, remove the fuse from its hinge as follows:
  - a. Grasp the universal pole with both hands (approximately 2 feet apart) with one hand at the end of the pole opposite from the Grappler.
  - b. Position the Grappler cone in the fuse pull ring and cradle the fuse in the Grappler prongs (see Figure 2).

- c. Stand in a normal, upright position facing the universal pole. Move the pole forward until resistance between the Grappler and the fuse is felt (approximately 2 inches). Then, remove the fuse from its hinge with a *forward and upward* lifting motion.

Alternately, the fuse-mounting contacts may be tested for voltage and then grounded by means of grounding leads properly connected to both source- and load-side fuse-mounting contacts, after which the fuse may be removed from the hinge by hand, using insulating rubber gloves.

*For SM-20 Power Fuses Rated 34.5 Kv:*

1. Use a universal pole equipped with an S&C Grappler to unlatch the fuse. Position the Grappler with the prongs downward, insert the longest prong of the Grappler into the fuse pull ring, and pull outward. Bring the fuse to the fully open position so that the Silencer rests against its stop, and disengage the Grappler.
2. Test the fuse-mounting contacts for voltage, then ground the contacts by means of grounding leads properly connected to both source- and load-side contacts. Remove the fuse from the hinge by hand, using insulating rubber gloves.

### Replacing the Fuse Unit

Complete instructions for removing blown (or unblown) SMU-20 Fuse Units from their end fittings, and for insertion of new fuse units, are described in the instruction sheet furnished with each fuse unit.

### Installing the Fuse in its Mounting

Follow the same procedures as outlined under "Fusing" on pages 3 and 4.

