

Installation and Operation

Table of Contents

Introduction	2	Safety Precautions	4
Qualified Persons	2	Overview	5
Read this Instruction Sheet	2	Installation	6
Proper Application	2	Operation	9
Safety Information	3		
Understanding Safety-Alert Messages	3		
Following Safety Instructions	3		
Replacement Instructions and Labels	3		



Introduction

Qualified Persons

WARNING

Only qualified persons 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 trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive 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 S&C Instruction Handbook before installing or operating an S&C Manual Geared Operating Handle. Become familiar with the Safety Information and Safety Precautions on pages 3 and 4. The latest version of this publication is available online in PDF format at sandc.com/en/support/product-literature/.

This instruction sheet is a permanent part of the S&C Manual Geared Operating Handle. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

WARNING

The equipment in this publication is only intended for use with the Mark V Circuit-Switcher when high-speed operation is not required. The application must be within the ratings furnished for the equipment. Ratings for the Mark V Circuit-Switcher are listed in the ratings table in S&C Specification Bulletin 711-31. The ratings are also on the S&C nameplate affixed to the product.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to an S&C Manual Geared Operating Handle. Become familiar 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 any portion of this instruction sheet is unclear and assistance is needed, contact the 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 an S&C Manual Geared Operating Handle.	

Replacement Instructions and Labels

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

DANGER



Equipment using S&C Manual Geared Operating Handles operates at high voltage. Failure to observe the precautions below will result in serious personal injury or death.

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

1. **QUALIFIED PERSONS.** Access to S&C Manual Geared Operating Handles 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, and flash clothing 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.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units that have been energized or installed near energized lines should be considered live until tested and grounded.
6. **CIRCUIT-SWITCHER POSITION.** Always confirm the circuit-switcher **Open/Close** position by visually observing the position of the blades. Switches may be energized from either side and with the blades in any position.
7. **GROUNDING.** The Mark V Circuit-Switcher must be connected to a suitable earth ground at the base of the utility pole, or to a suitable building ground for testing, before energizing the switch and at all times when energized.
The ground wire(s) must be bonded to the system neutral, if present. If the system neutral is not present, proper precautions must be taken to ensure the local earth ground, or building ground, cannot be severed or removed.
8. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
9. **OPERATION.** Circuit-making and circuit-breaking are involved in the normal operation of this interrupter switch and, as a result, "partway" opening or closing is undesirable. To operate, follow the operating procedure as outlined in Instruction Sheet 712-501.

The S&C Manual Geared Operating Handle (catalog number 5291) is suitable for operation of the following devices:

- Integer-style, vertical-break style, and center-break style S&C Mark V Circuit-Switchers with extruded-aluminum weldment bases●
- Line-Rupter™ Switches
- S&C Grounding Switches furnished as accessories for S&C Circuit-Switchers rated 115 kV through 500 kV
- Other devices that use a rotating vertical operating pipe

Note: Manually operated circuit-switchers do not provide the performance features obtainable with power-operated circuit-switchers, such as fault-closing ratings and opening and closing under ice formation, nor can they be furnished with the shunt-trip device. Also, for manually operated circuit-switchers and LineRupter Switches, the degree of simultaneity of opening and closing of the three pole-units depends on the proper installation and adjustment of the operating mechanism. It also depends on the speed of cranking at the operating handle and must be considered in establishing ground-relay settings.

The S&C Manual Geared Operating Handle includes the following features as standard:

- Mechanical position indicators for high-voltage switch **Open** and **Closed** positions
- A weatherproof, dust-proof enclosure
- A tamper-resistant design welded enclosure; baffled louvers; gasketed, flanged door openings; a cam-action door latch; and provisions for padlocking the operating handle and door
- A flexible coupling to connect the output shaft to the vertical operating pipe of served equipment (The pipe size to which the coupling is matched is designated by a suffix to the operating handle catalog number “-F1” for 1½-inch IPS, “-F2” for 2-inch IPS, “-F3” for 2½-inch IPS, or “-F4” for 3-inch IPS.)

The S&C Manual Geared Operating Handle may be furnished with optional accessories, designated by the inclusion of one or more additional suffixes to the operating handle catalog number. See S&C Specification Bulletin 711-31.

● The S&C Manual Geared Operating Handle is also suitable for use with integer-style S&C Mark II, Mark III, and Mark IV Circuit-Switchers and vertical-break style and center-break style S&C Mark II, Mark III, and Mark IV Circuit Switchers with extruded-aluminum weldment bases.

Installation

Complete the following steps to install an S&C Manual Geared Operating Handle:

- STEP 1.** Bolt the geared operating handle in position with $\frac{5}{8}$ -inch galvanized hardware using any two of the six holes in each of the mounting angles at the rear of the enclosure.
- STEP 2.** Attach the flexible coupling to the output shaft of the geared operating handle. See Figure 1. Thread the attachment bolts through the flexible coupling plate and through the coupling flange on the output shaft.

Tighten the bolts to draw the flexible plate flush against the flange; this will deform the threads in the flexible plate, resulting in a binding, nonslip connection. Install and tighten the self-locking nuts. Do not use lock washers with the flexible coupling attachment bolts.

- STEP 3.** Remove the clamping bolts from the clamp portion of the flexible coupling and set aside the detachable clamp plate. Install the vertical operating pipe.

Note: If there are multiple vertical operating pipe sections, start at the top and work downward. Make sure the cutting tips of the piercing set screws do not protrude through the body of the switch operator flexible coupling.

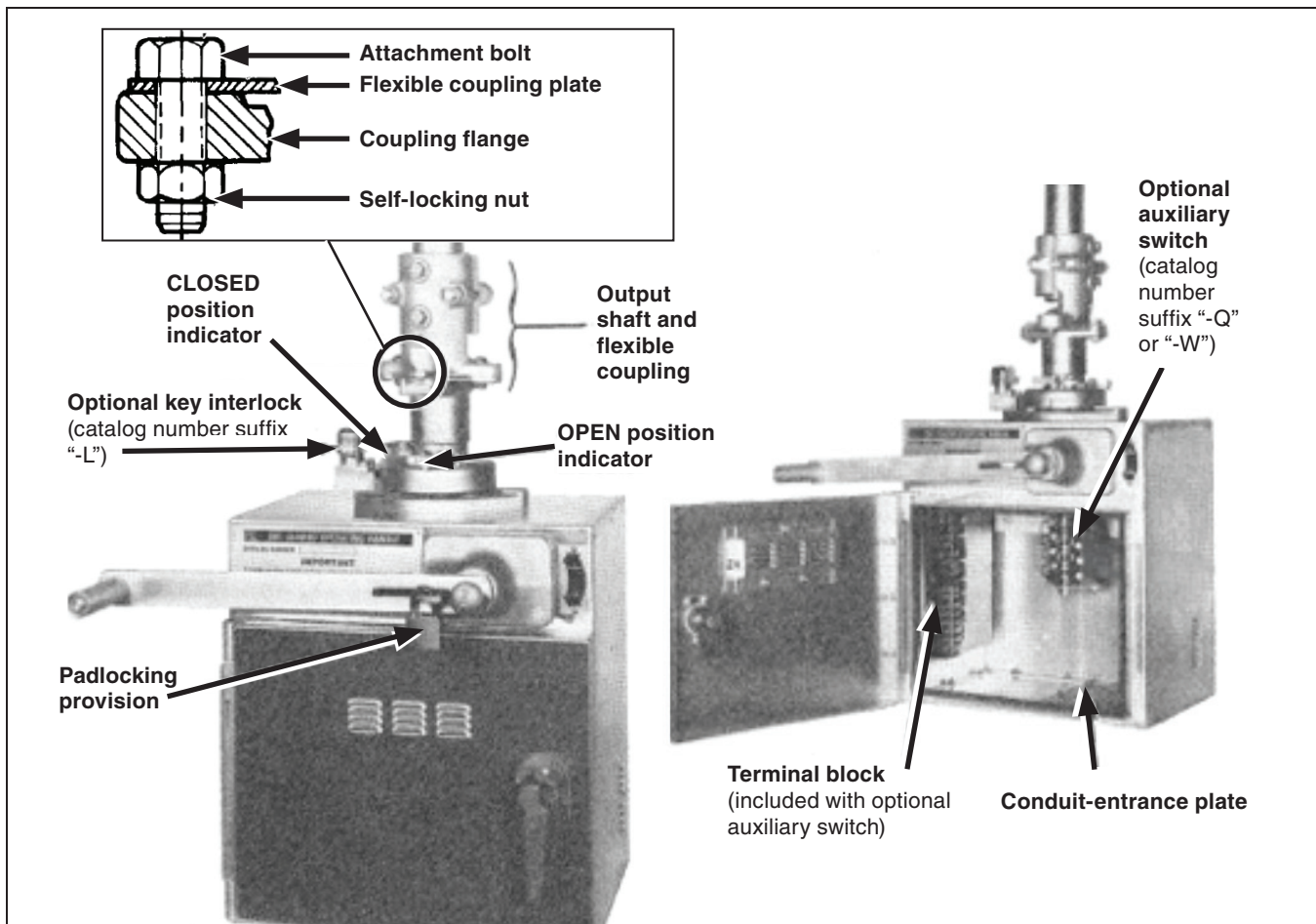


Figure 1. S&C Manual Geared Operating Handle.

- STEP 4.** Position the vertical operating pipe in the coupling and replace the detachable clamp plate.
- STEP 5.** Tighten the coupling clamp-bolts equally so the clamp pulls down evenly. Then, tighten the piercing set screws, piercing the pipe, and continue turning until feeling a firm resistance.

- STEP 6.** Check the cranking-direction label located at the handle hub. If the “TO OPEN” and “TO CLOSE” cranking directions indicated are incorrect, remove the screws holding the cranking-direction label. An alternate reading label is attached behind it and should be used instead.

Note: If a key interlock is not specified, omit Step 7.

- STEP 7.** The key interlock group includes a Superior Type B-4003-1 Key Interlock with a stainless steel locking bolt, zero bolt projection, and 3/4-inch (19-mm) bolt travel. It also includes a hinged dust cover, an interlock adapter, and an interlock collar which is bolted to the output shaft of the manual geared operating handle.

The interlock collar is provided with a slot to accept the key interlock bolt. If “provision only” for a key interlock is specified, the interlock will not be included. Proceed as follows:

- (a) Using the manual geared operating handle, crank the high-voltage switch to its fully **Open** position.
- (b) Remove the bolts fastening the interlock collar to the output shaft.
- (c) Rotate the interlock collar to the position where the key interlock bolt, when extended, is centered in the slot in the collar. Then, replace and tighten the bolts to fasten the interlock collar in that position.

Note: These same bolts are also used for the OPEN and CLOSED position indicators, which are to be set as described in Step 8.

- STEP 8.** Using the manual geared operating handle, crank the high-voltage switch to its fully **Open** position and set the OPEN position indicator on the output shaft of the manual geared operating handle so this indicator is visible from the front of the handle. Then, fully close the high-voltage switch and set the CLOSED position indicator on the output shaft of the manual geared operating handle so this indicator is visible from the front of the handle.

Installation

STEP 9. A conduit-entrance plate is provided at the bottom of the enclosure for use when the manual geared operating handle is equipped with an auxiliary switch for a remote indicating device.

If so equipped, mark the conduit entrance location on the conduit-entrance plate. Remove the plate and cut out the required opening. Then, replace the plate and install the entrance fittings. Verify the entrance fittings are properly sealed to prevent water ingress.

STEP 10. If the S&C Manual Geared Operating Handle is furnished with an auxiliary switch, catalog number suffix “-Q” or “-W,” the switch will be mounted inside the operating-handle enclosure, along with a terminal block for user’s connections. Each auxiliary-switch contact is operated by a cam-actuated roller.

A contact is closed if its roller is disengaged from a cam and, conversely, a contact is open if its roller is engaged by a cam. The cams are individually adjustable in 4.5-degree increments. Adjustment of the cams is accomplished as follows:

- (a) Raise (or lower) the cam toward its adjacent spring until the cam is separated from the teeth of the inner gear. See Figure 2.
- (b) Rotate the cam to advance or reduce engagement with its roller.
- (c) Lower (or raise) the cam, making sure the teeth are in mesh with the inner gear.

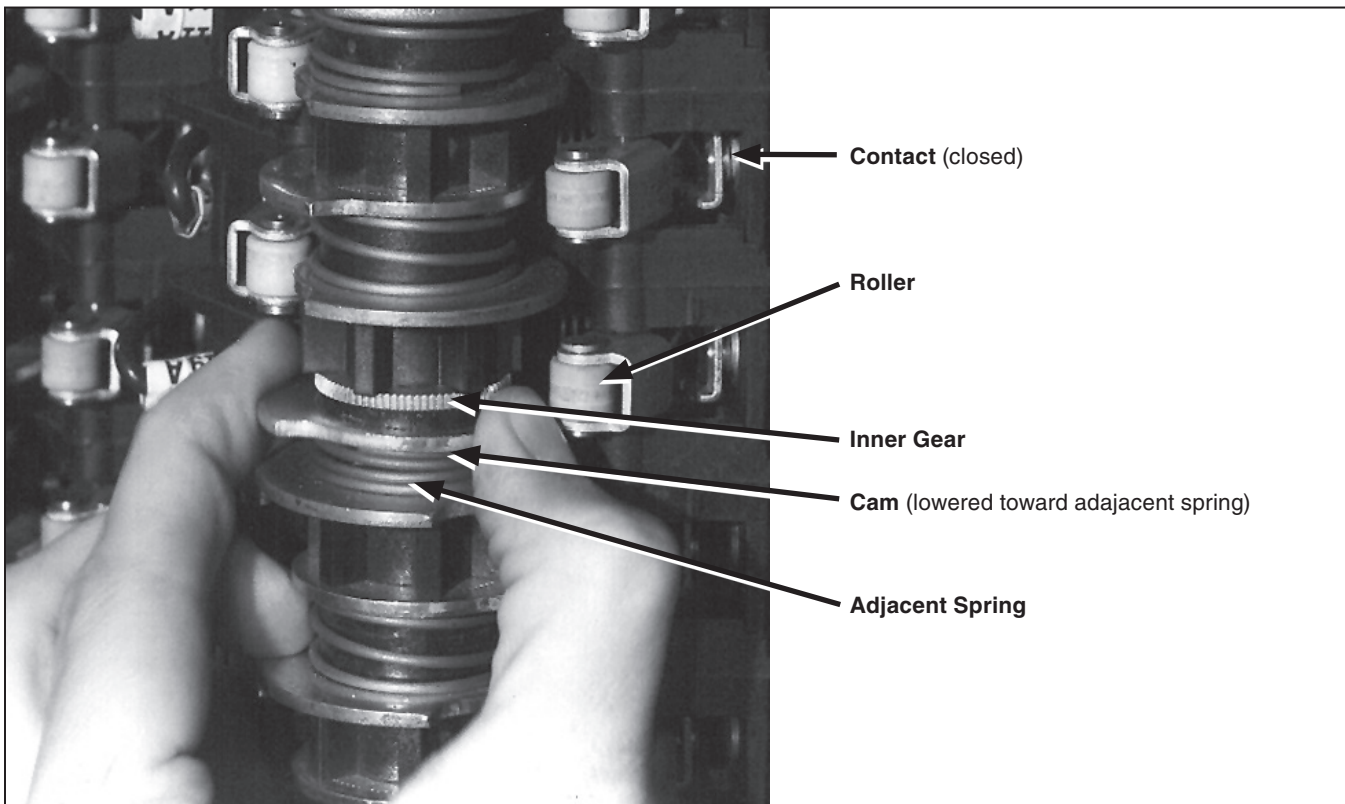


Figure 2. Adjusting cams on the auxiliary switch.

Note: To open or close the high-voltage switch when the circuit is energized, crank the manual geared operating handle rapidly and continuously until complete switch opening or closing has been achieved.

 **WARNING**

DO NOT close a grounding switch into an energized circuit. **Closing a grounding switch into an energized circuit may cause arcing, personal injury, or death.**

Do not assume the position of the manual geared operating handle necessarily indicates the **Open** or **Closed** position of the high-voltage switch. Upon completion of an opening or closing operation, make sure:

- The high-voltage SWITCH POSITION indicator located on the output shaft of the manual geared operating handle signals “OPEN” or “CLOSED,” as appropriate, to indicate the vertical operating pipe has fully rotated.
- The blades on all three pole-units of the high-voltage switch are fully open or fully closed, as appropriate (by visible verification).

After completing an opening or closing operation, pull and hold the knob on the handle hub to disengage the handle. Then, rotate the handle to its padlocking position and release the knob.