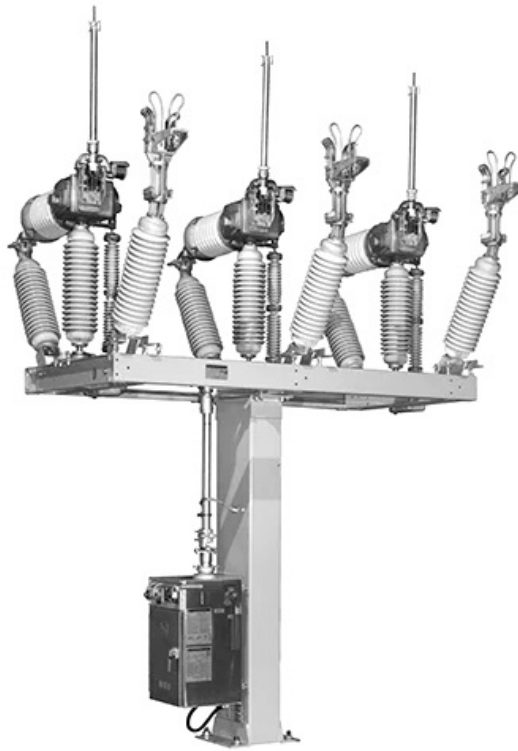




Contents [[hide](#)]

- 1 SandC Mark Circuit Switcher Switching and Protection
- 2 Conditions of Sale
 - 2.1 Standard
 - 2.2 Special To This Product
- 3 Application Classification
- 4 Ordering Tables
- 5 Dimensional Drawings
- 6 Specifications
- 7 FAQ
 - 7.1 Q: What is the voltage range for the Mark V Circuit-Switchers?
 - 7.2 Q: Are connectors included with the Circuit-Switchers?
 - 7.3 Q: What is required for high-speed tripping of power-operated Circuit-Switchers?
- 8 Documents / Resources
 - 8.1 References
- 9 Related Posts

SandC Mark Circuit Switcher Switching and Protection



INSTRUCTION MANUAL

Conditions of Sale

Standard

The seller's standard conditions of sale set forth in Price Sheet 150 apply, except as modified under the "Special Warranty Provisions" on page 3 and "Warranty Qualifications" sections on page 4.

Special To This Product

INCLUSIONS

The Mark V Circuit-Switcher uses an in-series circuit-breaking interrupter and a circuit-making and isolating disconnect, making it especially suited for switching and protection of transformers, lines, cables, capacitor banks, and line-connected or tertiary-connected shunt reactors. The Mark V Circuit-Switcher is suitable for frequent operation over a long period of time with minimal maintenance. It is capable of closing, carrying, and interrupting fault currents as well as load currents, and it uses interrupters economically tailored for specific applications by using the precise number of interrupting gaps required. These interrupters are unaffected if subjected to sustained system voltage for extended periods resulting from being left open with the disconnect blades closed for

any reason. The Mark V Circuit-Switcher is available in three styles—vertical-break, center-break, and integer.

POWER OPERATION

High-speed, high-torque power operation of S&C Mark V Circuit-Switchers is required to provide two-time duty-cycle fault-closing ratings of 30,000 amperes, RMS, three-phase symmetrical, 76,500 amperes peak for the vertical-break style and integer-style circuit-switchers; and two-time duty-cycle fault-closing ratings of 40,000 amperes, RMS, three-phase symmetrical, 102,000 amperes peak for the center-break style circuit-switchers. See the “Basis of Fault-Closing Ratings” section. Power operation of Mark V Circuit-Switchers also provides opening and closing without hesitation under $\frac{3}{4}$ -inch (19-mm) ice formation for the vertical-break and integer styles, $1\frac{1}{2}$ -inch (38-mm) ice formation for the center-break style, close interphase simultaneity, long life of fault-closing contacts under normal operating duties, and avoidance of excessive switching transients caused by prolonged or unstable prestrike arcing. Mark V Circuit-Switchers are provided with high-speed, high-torque power operation by adding Type CS-1A Switch Operators. Refer to S&C Specification Bulletin 719-31 for details on Type CS-1A Switch Operators.

For high-speed tripping of power-operated Mark V Circuit-Switchers, add an optional S&C Shunt-Trip Device. See Table 7 on page 11. This shunt-trip device provides high-speed (8-cycle) circuit interruption. The Type CS-1A Switch Operator is required if the shunt-trip device is specified.

BASIS OF FAULT-CLOSING RATINGS

Two-time duty-cycle fault-closing ratings, as set forth above and on succeeding pages, apply to Mark V Circuit-Switchers when powered by the Type CS-1A Switch Operator and are based on performance as follows:

1. The circuit-switcher is capable of two fault-closing operations consisting of closing against and carrying for three seconds● its rated fault-closing current, after which it can carry and interrupt its rated continuous current and is capable of power operation—either opening or closing.
2. After each occasion consisting of either one or two fault-closing operations at its rated fault-closing current, the circuit-switcher must be inspected and any necessary repair or

replacement of the fault-closing contacts made to restore the device to its original condition.

MANUAL OPERATION

Integer-style, vertical-break style, and center-break style Mark V Circuit-Switchers (with extruded-aluminum weldment bases)—are all available for manual operation. Manually operated circuit-switchers, however, do not provide the performance features obtainable with power-operated circuit-switchers described in the “Power Operation” section on page 2 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 Mark V Circuit-Switchers, the degree of simultaneity of opening and closing of the three pole-units depends on the proper installation and adjustment of the operating mechanism—as well as on the speed of cranking at the operating handle—and must be considered in establishing ground-relay settings. If manual operation is desired, specify the S&C Manual Geared Operating Handle listed in Table 9 on page 15.

MOUNTING OF CIRCUIT-SWITCHERS

The high operating speed makes possible many of the Mark-V Circuit-Switcher’s superior performance features when power-operated (described on page 1) and brings about the high dynamic forces for which S&C Mounting Pedestals were specifically designed—and are thus highly recommended. (See Table 13 on page 17.) Alternately, circuit-switchers can be installed on the user’s steel pedestals or supporting structures, which must meet specific static and dynamic deflection limits shown on the data sheets listed in Table 1.

Table 1. Static and Dynamic Deflection Limit Resources

Circuit-Switcher Style and Rating	Static and Dynamic Loading Specifications
Vertical-break, 34 .5 through 161 kV	Data Sheet 711-300

Center-break, 230 kV: extruded-aluminum weldment base	Data Sheet 711-301
Center-break, 345 kV: aluminum-sheathed steel weldment base	Data Sheet 711-302
Integer, 34 .5 through 69 kV	Data Sheet 711-303

EXCLUSIONS

Mark V Circuit-Switchers do not include connectors. Various connectors are available, as listed in Table 8 on page 14. Specify the quantity and catalog number of the connectors desired.

Circuit-switchers do not include manual operating handles.

Mounting pedestals and anchor bolts, if furnished, are not included and must be ordered separately. For mounting pedestals and anchor bolts, see Table 13 on page 17.

Circuit-switchers do not include the services of an S&C field service specialist for evaluating the condition of the circuit-switcher.

SPECIFICATION DEVIATIONS

When Mark V Circuit-Switchers are to be provided with special connectors (including all expansion, compression, and multi-conductor types), refer to the nearest S&C Sales Office.

Single-, two-, and four-pole vertical-break style and center-break style circuit-switchers are available. Refer to the nearest S&C Sales Office.

USUAL OPERATING CONDITIONS

Mark V Circuit-Switchers will perform as intended at temperatures within the range of -40°C to +40°C (-40°F to +104°F), at altitudes of up to 3300 feet (1000 meters),●, and at wind loadings of up to 100 miles per hour (160 kilometers per hour).

Mark V Circuit-Switchers, when installed with the recommended S&C Mounting

Pedestals and anchor bolts (see Table 13 on page 17), are capable of withstanding seismic loading of 0.2-g ground acceleration in any direction, as well as performing as intended during such loading and afterward.

For applications at temperatures not within the specified range, at higher altitudes, at higher wind loadings, or where higher seismic withstand capabilities are required, refer to the nearest S&C Sales Office.

SPECIAL WARRANTY PROVISIONS

The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheet 150, applies to Mark V Circuit-Switchers and accessories and associated switch operators, except the first paragraph of the said warranty is replaced by the following:

(1) General: The seller warrants to the purchaser for a period of five years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within five years after the date of shipment, the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at the seller's option) by shipment of necessary replacement parts. Replacement parts provided by the seller under the warranty for the original equipment will be covered by the original-equipment warranty for its duration. Replacement parts purchased separately will be covered by the warranty contained in the seller's standard conditions of sale, as set forth in Price Sheet 150.

Mark V Circuit-Switchers can be installed at altitudes greater than 3300 feet (1000 meters), but deratings to the BIL voltage will apply. Refer to the nearest S&C Sales Office for details.

WARRANTY QUALIFICATIONS

Warranty of circuit-switchers is contingent upon each of the following:

- Observance of the static and dynamic deflection limits shown on S&C Data Sheet 711-300, 711-301, 711- 302, or 711-303, as applicable
- Power operation of circuit-switchers only by S&C Switch Operators
- Installation and adjustment of circuit-switchers in accordance with S&C's applicable erection drawings and instruction sheets
- Conformance with the inspection recommendations defined in S&C Instruction Sheet 711-590

Complete these steps to identify the base catalog number, the appropriate options, and the product accessories to complete this order:

STEP 1. Obtain the catalog number of the desired circuit-switcher from Table 3 and Table 4 on page 9, and Table 5 and Table 6 on page 10.

Catalog Number:

1	5	7	3	1	4
---	---	---	---	---	---

STEP 2. Obtain the suffix letters of optional features, if desired, from Table 7 on page 11 through page 12. Add the indicated suffix letter(s) to the catalog number of the circuit-switcher selected in Step 1.

Catalog Number:

1	5	7	3	1	4
---	---	---	---	---	---

Suffix: —

T	1
---	---

STEP 3. Obtain the catalog number of the mounting pedestal(s), if desired, from Table 13 on page 17. From this same table, obtain the catalog number of the required anchor bolts, taking care to note the quantity of anchor bolts required for the circuit-switcher selected.

Catalog Number:

9	2	4	5	0	R	1	—	G
---	---	---	---	---	---	---	---	---

Catalog Number:

S	—	8	1	3	6	5	—	2
---	---	---	---	---	---	---	---	---

STEP 4. Select a manual handle or switch operator.

If manual operation is desired: Order an S&C Manual Geared Operating Handle. Obtain the catalog number for the manual handle from Table 9 on page 15.

If accessories for the manual geared operating handle are desired: Obtain the suffix letters of the desired accessories from Table 10. Add the indicated suffix letter(s) to the catalog number of the operating handle.

Catalog Number:

5	2	9	1	—	F	1
---	---	---	---	---	---	---

Suffix: —

F	1
---	---

If power operation is desired, order a Type CS-1A Switch Operator. Refer to Specification Bulletin 719-31 for catalog and ordering information.

STEP 5. If connectors are desired, obtain the catalog number of the desired connector from Table 8 on page 14. Order six connectors for each circuit-switcher.

Catalog Number:

4	5	6	8
---	---	---	---

Example: The final catalog number for a complete order that includes a 138-kV, 1200-A continuous circuit-switcher, two interrupting gaps, with pre-assembly and a 125-Vdc shunt-trip device would be:

157329—AT2

Note: All Mark V Circuit-Switcher orders must be designed by S&C's Custom Engineering team. Spare or replacement interrupters for Mark V Circuit-Switchers are ordered using the same method outlined above.

Application Classification

Table 2. Application Classifications

Application			Maximum Amperes, Interrupting, RMS, Symmetrical	Symbol	
Class		Qualifications		Solidly or Effectively ^① Grounded System	Ungrounded System
Transformer Switching and Protection	Parallel switching	Max 60-Hertz recovery voltage: 90 kV, RMS⑤	1200/1600/2000●	M	M
		Max 60-Hertz recovery voltage: 150 kV, RMS⑤	1200/1600/2000●	M	N
	Load dropping and magnetizing current switching	Transformers⑥ connected solidly grounded-wye on the primary (circuit-switcher) side and delta on the secondary side	■	E	—
		All other connections of transformers⑥	■	B	B
	Fault interrupting④	Primary faults—with the total connected length of all lines on the source side of the circuit-switcher not less than that indicated in footnote⑦	7000 or 8000▲◆	J	J
		Primary faults—with the total connected length of all lines on the source side of the circuit-switcher less than that indicated in footnote⑦	4000▲▼	G	G
		Secondary faults—transformers⑥ connected solidly grounded-wye on the primary (circuit-switcher) side and delta on the secondary side	4000□▲	△	G
		Secondary faults—all other connections of transformers	4000□▲	G	G
		Internal faults—see both primary and secondary faults, above			
Line Switching and Protection	Load splitting (parallel or loop switching)	Max 60-Hertz recovery voltage: 90 kV, RMS⑤	1200/1600/2000●	M	M
		Max 60-Hertz recovery voltage: 150 kV, RMS⑤	1200/1600/2000●	N	N
	Load dropping	Circuits with <i>all</i> load-side transformers⑥ connected solidly grounded-wye on the primary (circuit-switcher) side and delta on the secondary side⑧	1200/1600/2000●	E	—
		Circuits with load-side transformers connected other than as described above	1200/1600/2000●	B	B
	Line dropping		◇	K	L
	Fault interrupting④	Line or bus faults—with the total connected length of all lines on the source side of the circuit-switcher <i>not less than</i> that indicated in footnote⑦	7000 or 8000▲▽	J	J
		Line or bus faults—with the total connected length of all lines on the source side of the circuit-switcher <i>less than</i> that indicated in footnote⑦	4000▲▼	G	G

Application				Maximum Amperes, Interrupting, RMS, Symmetrical	Symbol	
Class		Qualifications			Solidly or Effectively ^① Grounded System	Ungrounded System
Cable Switching and Protection	Load splitting (parallel or loop switching)	Max 60-Hertz recovery voltage: 90 kV, RMS⑤		1200/1600/2000●	M	M
		Max 60-Hertz recovery voltage: 150 kV, RMS⑤		1200/1600/2000 ●	N	N
	Load dropping	Circuits with all load-side transformers⑥ connected solidly grounded-wye on the primary (circuit-switcher) side and delta on the secondary side⑧		1200/1600/2000●	E	—
		Circuits with load-side transformers connected other than as described above		1200/1600/2000●	B	B
	Cable dropping (charging current)	Shielded cable		550	H	L
		Unshielded cable		550	K	L
	Fault interrupting④	Cable or bus faults—with any total connected length of cable, and with a total connected length of all overhead lines on the source side of the circuit-switcher not less than that indicated in footnote⑦		7000 or 8000▲⬤	J	J
		Cable or bus faults—with any total connected length of cable, but with a total connected length of all overhead lines on the source side of the circuit-switcher less than that indicated in footnote⑦		4000▲▼	G	G
Shunt Capacitor Bank② Switching and Protection③	Bank current switching	Grounded capacitor bank	Applications on solidly grounded systems through 69 kV	1000⬤	H	—
			All other applications	550	H	L
		Ungrounded capacitor bank		550	L	L
	Fault interrupting④	Primary faults—with the total connected length of all lines on the source side of the circuit-switcher <i>not less than</i> that indicated in footnote⑦		7000 or 8000▲◆	⬤	L
		Primary faults—with the total connected length of all lines on the source side of the circuit-switcher less than that indicated in footnote⑦		4000▲▼	⬤	L
Series Reactor Switching		Refer to the nearest S&C Sales Office				
Shunt Reactor Switching and Protection (line-connected or tertiary-connected reactors)	Reactor current switching	Reactor wye-connected with solidly grounded neutral		1000▽▣	P	R
		Reactor delta-connected, or wye-connected with ungrounded neutral⑨		1000▽▣	R	R
	Fault interrupting④	Oil-insulated reactors		2800▲	◄	R
		Air-insulated reactors		2000▲	◄	R

① X0/X1 from 0 to + 3.0 and R0 /X1 from 0 to + 1.0.

② Includes both single and multiple (back-to-back) banks.

③ S&C BankGuard Plus® Controls, described and listed in S&C Specification Bulletin 1011-31 have the sensitivity to detect the first faulted unit in a capacitor bank or to promptly respond to a shorted-turns fault in a shunt reactor—but with the discrimination to disregard system and bank unbalances as well as spurious transients. For installations of S&C Automatic Control Devices on, or in the same substation with, 345-kV or 500-kV circuits, contact the nearest S&C Sales Office.

④ The interrupting ratings shown are applicable for the following reclosing duty cycle: O + 0 seconds (no intentional delay) + CO + 0 seconds + CO.

⑤ For integer-style circuit-switchers (except catalog numbers 157886 and 157986) the maximum 60-Hertz recovery voltage is 75 kV, RMS.

⑥ Three-phase transformers or three-phase banks of single-phase transformers.

TABLE 2 FOOTNOTES CONTINUED

⑦ Total connected length of all overhead lines (in all directions), including any number of feeders connected to source-side substations, as indicated in table below. Connected cable may reduce or eliminate the line-length requirement. Contact the nearest S&C Sales Office.

System Voltage, kV →	34.5 thru 69	115 and 138	161	230	345
Total Length, Miles (km) →	7 (11)	15 (24)	20 (32)	25 (40)	40 (64)

⑧ And all single-phase transformers connected phase-to-ground on the primary (circuit-switcher) side.

⑨ For applications involving wye-connected reactor banks with neutral grounded through a fourth reactor, contact the nearest S&C Sales Office.

- Depending upon continuous rating of the circuit-switcher.

- Circuit-switcher will drop loads through 1200, 1600, or 2000 amperes, depending upon its continuous rating, and will switch magnetizing currents associated with such loads.

- ▲ Tripping of a circuit-switcher must be coordinated with a series power fuse or with source-side protective equipment for short-circuit currents in excess of this value.

- ◆ 8000 amperes for all Mark V Circuit-Switcher models rated 34.5 kV through 69 kV, also 2-gap models rated 115 kV and 3-gap models rated 138 kV and 161 kV; 7000 amperes for all other Mark V Circuit-Switchers for which symbol “J” applies.

- ▼ 3000 amperes for 115-kV single-gap Mark V Circuit-Switchers.

- The Mark V Circuit-Switcher is suitable for transformer-primary applications where the inherent secondary-fault current—the secondary-side fault current as reflected on the primary side of the transformer, assuming an infinite (zero-impedance) source—does not exceed 4000 amperes (3000 amperes in the case of 115-kV single-gap Mark V Circuit-Switchers) for a fault external to the transformer. The inherent secondary-fault current may be calculated as follows:

$$I = \frac{57.8P}{(\%Z)E}$$

where I = Inherent secondary-fault current, amperes

P =Transformer self-cooled three-phase rating, kVA

E = Primary-side system phase-to-phase voltage, kV

%Z = Percent transformer primary-to-secondary impedance, referred to transformer self-cooled three-phase kVA rating

For applications where the inherent secondary-fault current exceeds the above limits but where the maximum expected fault current, based on transformer impedance plus source impedance (anticipating future system growth), is within these limits, contact the nearest S&C Sales Office.

△ Symbol “E” for solidly grounded systems; symbol “F” for effectively grounded systems.

◇ Maximum length of line: 300 miles.

▽ For vertical-break and integer style circuit-switcher applications where load in excess of 550 amperes is to be switched frequently, extra-performance closing contacts are recommended for increased contact life; refer to the Table 7 on page 11 through page 12.

● Symbol “K” for solidly grounded capacitor banks applied on solidly grounded systems; symbol “L” for all other applications.

■ For center-break style circuit-switcher reactor switching applications above 500 amperes, contact the nearest S&C Sales Office.

▲ For applications up to 4000 amperes, contact the nearest S&C Sales Office.

◀ Symbol “P” for solidly grounded reactors applied on solidly grounded systems, provided phase-to-phase and ungrounded three-phase faults are cleared by other devices; symbol “R” for all other applications.

Table 3. Circuit-Switchers—Three-Pole Vertical-Break Style①②③

Ratings							No. of Interrupting Gaps	Application Classifications (see Table 2 on page 6)	Insu- lator T.R. No.	Leakage Distance, Inches (mm)	Catalog Number⑤	Page Reference for Dimen- sional Informa- tion
kV			Amperes, RMS									
Nom.	Max.	BIL	Cont.	Short-Time		Fault- Closing, Duty-Cycle, Two-Time④						
				Mom.	3-Sec.							
34.5	38	200	1200	61 000	40 000	30 000	1	BEFGHJKLMPR	210	37 (940)	157314	18
46	48.3	250	1200	61 000	40 000	30 000	1	BEFGHJKLMPR	214	43 (1092)	157315	
69	72.5	350	1200	61 000	40 000	30 000	1	BEFGHJKMP	216	72 (1829)	157316	
							2	BEFGHJKLMPR	216		157326	
115	121	550	1200	61 000	40 000	30 000	1	BEFGJM	286	99 (2515)	157318	
							2	BEFGHJKLMNPR	286		157328	
138	145	650	1200	61 000	40 000	30 000	2	BEFGHJKMNP	288	116 (2946)	157329	
							3	BEFGHJKLMNPR	288		157369	
161	169	750	1200	61 000	40 000	30 000	2	BEFGHJKMNP	291	132 (3353)	157320	
							3	BEFGHJKLMNPR	291		157360	

① Circuit-switchers do not include connectors. Refer to Table 8 on page 14. Circuit-switchers are furnished with gray (Munsell Number 5 BG 7.0/014) station post insulators.

② Circuit-switchers do not include manual operating handles. (See Table 9 on page 15.)

③ Shunt-trip device is available with all power-operated Vertical-Break Style Mark V Circuit-Switchers.

④ For complete information refer to the “Basis of Fault-Closing Ratings” section on page 2.

⑤ If the circuit-switcher is to be installed on a structure other than S&C Mounting Pedestals (see Table 13 on page 17), detailed drawings of the user-furnished mounting structure must be supplied at the time of order. Please contact your nearest S&C Sales Office for details

Table 4. Circuit-Switchers—Three-Pole Center-Break Style, with Extruded-Aluminum Weldment Bases^{①②③④⑤}

Ratings							No. of Interrupting Gaps	Application Classifications (see Table 2 on page 6)	Insulator T.R. No.	Leakage Distance, Inches (mm)	Catalog Number ^⑦	Page Reference for Dimensional Information
kV			Amperes, RMS									
Nom.	Max.	BIL	Cont.	Short-Time		Fault-Closing, Duty-Cycle, Two-Time ^⑥						
				Mom.	3-Sec.							
230	242	900	1600	70 000	42 750	40 000	3	BEFGHJKMNP	308	165 (4191)	657361R2	20
			2000	80 000	50 000	40 000	3	BEFGHJKMNP	308	165 (4191)	757361R2	

- ① Circuit-switchers do not include connectors. Refer to Table 8 on page 14. Circuit-switchers are furnished with gray (Munsell Number 5 BG 7.0/014) station post insulators.
- ② Circuit-switchers do not include manual operating handles. (See Table 9 on page 15.)
- ③ Shunt-trip device is available with all power-operated center-break style Mark V Circuit-Switchers.
- ④ For center-break style circuit-switchers, blade opening direction, as viewed from interrupter end, is to the left.
- ⑤ Flexible-conductor connections are recommended at both ends of all center-break style circuit-switchers with extruded-aluminum weldment bases, except when the bypass accessory (catalog number suffix “-B2”) is furnished. In this instance, a rigid bus connection is necessary at the rotating-insulator end. To reduce circuit-switcher deflection during opening and closing operations—which can loosen the bus connection—double-acting shock absorbers (catalog number suffix “-H”) are available and are recommended.
- ⑥ For complete information refer to the “Basis of Fault-Closing Ratings” section on page 2.
- ⑦ If the circuit-switcher is to be installed on a structure other than S&C Mounting Pedestals (see Table 13 on page 17), detailed drawings of the user-furnished mounting structure must be supplied at the time of order. Please contact your nearest S&C Sales Office for details.

Ordering Tables

Table 5. Circuit-Switchers—Three-Pole Center-Break Style,with Aluminum-Sheathed Steel Weldment Bases①②③④

Ratings							No. of Interrupting Gaps	Application Classifications (see Table 2 on page 6)	Insulator T.R. No.	Leakage Distance, Inches (mm)	Catalog Number ^⑥	Page Reference for Dimensional Information
kV			Amperes, RMS									
Nom.	Max.	BIL	Cont.	Short-Time		Fault-Closing, Duty-Cycle, Two-Time ^⑤						
				Mom.	3-Sec.							
345	362	1300	1600	70 000	43 750	40 000	3	E●MN	368	231 (5867)	357363	22
			2000	80 000	50 000	40 000	3	E●MN	368	231 (5867)	557363	

- ① Circuit-switchers do not include connectors. Refer to Table 8 on page 14. Circuit-switchers are furnished with gray (Munsell Number 5 BG 7.0/014) station post insulators.

- ② These circuit-switchers cannot be furnished with manual operating handles.
- ③ Shunt-trip device is available with all power-operated center-break style Mark V Circuit-Switchers.
- ④ For center-break style circuit-switchers, blade opening direction, as viewed from interrupter end, is to the left.
- ⑤ For complete information refer to the “Basis of Fault-Closing Ratings” section on page 2.
- ⑥ If the circuit-switcher is to be installed on a structure other than S&C Mounting Pedestals (see Table 13 on page 17), detailed drawings of the user-furnished mounting structure must be supplied at the time of order. Please contact your nearest S&C Sales Office for details.
- Not applicable for fault-interrupting duty. Also suitable for three-phase transformers and three-phase banks of single-phase transformers connected solidly grounded-wye on the primary (circuit-switcher) side, solidly grounded-wye on the secondary side, with a delta-connected tertiary.

Table 6. Circuit-Switchers—Three-Pole Integer Style①②

Ratings							No. of Interrupting Gaps	Application Classifications (see Table 2 on page 6)	Insulator T.R. No.	Leakage Distance, Inches (mm)	Catalog Number④		Page Reference for Dimensional Information
kV			Amperes, RMS								Vertical Operating Shaft Inboard	Vertical Operating Shaft Outboard⑤	
Nom.	Max.	BIL	Cont.	Short-Time		Fault-Closing, Duty-Cycle, Two-Time③							
				Mom.	3-Sec.								
34.5	38	200	1200	61 000	40 000	30 000	1	BEFGHJKLMPR	210	37 (940)	157914	157814	24
46	48.3	250	1200	61 000	40 000	30 000	1	BEFGHJKLMPR	214	43 (1092)	157915	157815	
69	72.5	350	1200	61 000	40 000	30 000	1	BEFGHJKMP	216	72 (1829)	157916	157816	
							2	BEFGHJKLMPR	216	72 (1829)	157926	157826	

- ① Circuit-switchers do not include connectors. Refer to Table 8 on page 14. Circuit-switchers are furnished with gray (Munsell Number 5 BG 7.0/014) station post insulators.
- ② Circuit-switchers do not include manual operating handles. (See Table 9 on page 15).
- ③ For complete information refer to the “Basis of Fault-Closing Ratings” section on page 2.

S&C Mounting Pedestals (see Table 13 on page 17), detailed drawings of the user-furnished mounting structure must be supplied at the time of the order. Please contact

your nearest S&C Sales Office for details.

⑤ As viewed from interrupter end.

Table 7. Optional Features—For Mark V Circuit-Switchers

Item	Suffix to be Added to Circuit-Switcher Catalog Number	Applicable to Circuit-Switcher	
		Style	Rating, kV
Pre-assembled Mark V Circuit-Switcher—provides three pole-units, each consisting of a brain and interrupter assembly, integral disconnect blade, jaw-contact assembly, terminal adapter, support insulators, channel base, and shunt-trip device (when applicable)—all factory-assembled and adjusted	-A	Vertical-break	69 thru 161
		Center-break	230
Shunt-trip device, 48-Vdc control voltage—provides 8-cycle maximum interrupting time for Mark V Circuit-Switcher operated by a Type CS-1A Switch Operator. Not available with manually operated circuit-switchers①②	-T1	All	34.5 thru 69
			115 and 138
			161
			230
			345
Shunt-trip device, 125-Vdc control voltage—provides 8-cycle maximum interrupting time for Mark V Circuit-Switcher operated by a Type CS-1A Switch Operator. Not available with manually operated circuit-switchers①②	-T2	All	34.5 thru 69
			115 and 138
			161
			230
			345
Bypass accessory, single-pole, stick-operated, set of three, 800 amperes continuous, 20,000 amperes momentary rating—permits exercising of the circuit-switcher and checkout of relaying equipment without opening high-voltage circuit	-B1	Integer and vertical-break	34.5
			46
			69
		Vertical-break	115
			138
Bypass accessory, single-pole, stick-operated, set of three, 1200 amperes continuous, 61,000 amperes momentary rating—permits exercising of the circuit-switcher and checkout of relaying equipment without opening high-voltage circuit	-B2	Vertical-break	34.5
			46
			69
			115
			138
			161
		Center-break⑤	230
Extra-performance closing contacts—provide increased contact life for 34.5-kV through 138-kV vertical-break and integer style circuit-switchers in applications where load in excess of 550 amperes is switched frequently. Each pole-unit set consists of one copper-tungsten arcing-tip assembly in substitution for the standard stainless steel arcing-tip assembly and one carbon arcing-rod assembly with support clamp③④	-C1	Integer and vertical-break	34.5 thru 138

Item	Suffix to be Added to Circuit-Switcher Catalog Number	Applicable to Circuit-Switcher	
		Style	Rating, kV
Grounding switch, manual, three-pole, group-operated, 61,000 amperes momentary rating, with flexible straps for current transfer at hinge end of blades, and with 90° opening blades <i>parallel</i> to bases when in open position. Includes manual operating handle①	-G2	All	34.5
			46
			69
			115
			138
			161
			230
Grounding switch, manual, three-pole, group-operated, 80,000 amperes momentary rating, with flexible straps for current transfer at hinge end of blades, and with 90° opening blades <i>perpendicular</i> to bases when in open position. Includes manual operating handle②③	-G4	Center-break	230
Grounding switch, manual, three-pole, group-operated, 61,000 amperes momentary rating, with flexible straps for current transfer at hinge-end of blades, and with 90° opening blades <i>perpendicular</i> to bases when in open position. Includes manual operating handle	-G22	Vertical-break and center-break	34.5
			46
			69
			115
			138
Grounding switch, manual, three-pole, group-operated, 61,000 amperes momentary rating, with braidless current transfer at hinge-end of blades, and with 90° opening blades <i>perpendicular</i> to bases when in open position. Includes manual operating handle	-G23	Vertical-break and center-break	161
Double-acting shock absorbers—for center-break style circuit-switchers with extruded-aluminum weldment bases. Reduce deflection during opening and closing operations④	-H	Center-break	230
Key type interlock, for use on grounding switch (catalog number suffix “-G2” or “-G4”), key to be matched with “Key Interlock with Switch” as optionally furnished with S&C Switch Operators and/or other interlocked device(s). See the “Accessories for Switch Operators” table in S&C Specification Bulletin 719-31, catalog number suffix “-L”; or Table 10 on page 15, catalog number suffix “-L”	-L	All	All
International crating. Wood used is either hardwood or certified by the supplier as “Heat treated (kiln dried) to a core temperature of 133°F (56°C) for a minimum of 30 minutes”	-L71	All	All
Low-temperature interrupters. For applications where temperature regularly falls below –40°F (–40°C). Includes modified red target indicators	-N2	All	All

Item			Suffix to be Added to Circuit-Switcher Catalog Number	Applicable to Circuit-Switcher	
Pre-insertion inductors①②③	For Capacitor Bank			Style	Rating, kV
	System Voltage Rating, kV, Nom.	Size, MVAC④			
Enhanced-duty pre-insertion inductors⑤ — for circuit-switchers in single-bank capacitor switching applications. Limit inrush current, overvoltage, and audible noise at capacitor bank bus. Also limit switching-surge overvoltages at remote transformers. Not available with manually operated circuit-switchers	34.5	3 to 11	-P6	Integer and vertical-break	34.5
		12 to 22	-P61		
	46	4 to 18	-P6		46
		19 to 36	-P61		
	69	5 to 20	-P6	Integer (1 gap)	69
				Integer (2 gap)	
				Vertical-break	
		21 to 42	-P61	Integer (1 gap)●	69
				Integer (2 gap)●	
				Vertical-break	
	115	10 to 60	-P6	Vertical-break	115
	138	13 to 75			138
Standard-duty pre-insertion inductors⑤ — for circuit-switchers in single-bank capacitor switching applications. Limit inrush current, overvoltage, and audible noise at capacitor bank bus. Also limit switching-surge overvoltages at remote transformers. Not available with manually operated circuit-switchers	34.5	3 to 33	-P5	Integer and vertical-break	34.5
	46	4 to 44			46
	69	5 to 65	-P●	Integer and vertical-break	69
			-P51●	Integer (1 gap)■▲	69
				Integer (2 gap)■▲	
				Vertical-break▲	
	115	10 to 84	-P5	Vertical-break	115
	138	13 to 81			138
	230	17 to 198		Center-break◆	230

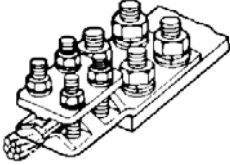
Table 7. Optional Features—For Mark V Circuit-Switchers—Continued

Item	Suffix to be Added to Circuit-Switcher Catalog Number	Applicable to Circuit-Switcher
		Voltage, Nom., kV
Mark V Circuit-Switcher furnished less insulators①	-Z1	34.5
		46
		69
		115
		138
		161
		230
		345
		Voltage, Nom., kV② From ➞ To
Mark V Circuit-Switcher furnished with insulators of the next <i>lower</i> voltage rating	-Z2	46 ➞ 34.5
		69 ➞ 46
		115 ➞ 69
		138 ➞ 115
		161 ➞ 138
		230 ➞ 161
Mark V Circuit-Switcher furnished with insulators of the next <i>higher</i> voltage rating	-Z3	34.5 ➞ 46
		46 ➞ 69
		69 ➞ 115
		115 ➞ 138
		138 ➞ 161
		161 ➞ 230

^① Not available for integer-style switches.

^② In instances where insulators of the next-lower or next-higher voltage rating have different bolt-circle dimensions, adapters are required; refer to your nearest S&C Sales Office.

Table 8. Connectors^①

Illustration	Description	Accommodating Conductor	Catalog Number ^②
	Standard bronze pad terminal, four-bolt, tin plated. Includes ½-inch galvanized steel hardware for attachment to terminal pads of the circuit-switchers	2/0 stranded (89.0 mm²) through 800 kc mil (538.6 mm²) copper	4568R1
		4/0 stranded (141.3 mm²) through 1000 kc mil (672.5 mm²) copper	4569R1
	Standard aluminum-alloy pad terminal, four-bolt. Includes ½-inch galvanized steel hardware for attachment to terminal pads of circuit-switchers	250 kc mil (167.5 mm²) through 400 kc mil (268.5 mm²) copper or aluminum	5329
		350 kc mil (235.0 mm²) through 600 kc mil (404.1 mm²) copper or aluminum	5331
		600 kc mil (404.1 mm²) through 900 kc mil (606.4 mm²) copper or aluminum	5333
		900 kc mil (606.4 mm²) through 1250 kc mil (841.9 mm²) copper or aluminum	5334

^① Connectors listed are suitable only for applications through 161 kV. For connectors for higher voltage applications, contact the nearest S&C Sales Office.

^② Add suffix letter to the catalog number to specify appropriate mounting bolt length as follows:

“-A” for ½–13×1
 “-B” for ½–13×1½
 “-C” for ½–13×2

Table 9. S&C Manual Geared Operating Handle—For Mark V Circuit-Switchers

Item	Catalog Number
Manual geared operating handle	5291●

Table 10. Accessories—For Manual Geared Operating Handle

Item	Suffix to be Added to Operating Handle Catalog Number
Flexible coupling—for use with 1½-inch IPS vertical operating pipe (comes standard when manual geared operating handle is ordered with a circuit-switcher)	-F1
Flexible coupling—for use with 2-inch IPS vertical operating pipe (comes standard when manual geared operating handle is ordered with a circuit-switcher)	-F2
Flexible coupling—for use with 2½-inch IPS vertical operating pipe (comes standard when manual geared operating handle is ordered with a circuit-switcher)	-F3
Flexible coupling—for use with 3-inch IPS vertical operating pipe (comes standard when manual geared operating handle is ordered with a circuit-switcher)	-F4
Key interlock, locks circuit-switcher open	-L
Auxiliary switch (individually adjustable contacts), 4-PST—coupled to circuit-switcher①	-Q
Auxiliary switch (individually adjustable contacts), 8-PST—coupled to circuit-switcher①	-W

Table 11. Spare or Replacement Interrupters—For Mark V Circuit-Switchers

Item	For Mark V Circuit-Switcher		Obsolete Catalog Number	Replacement Catalog Number①②	Replacement Catalog Number (Low-Temperature)③
	Style	No. of Interrupting Gaps			
Interrupter, single-gap	Integer	1	SA-40315	SA-43826-A●	SA-43826-1-A
		1	SA-40316	SA-43827-A■	SA-43827-1-A
	Vertical-break and center-break	1	SA-40316	SA-43827-A	SA-43827-1-A
Interrupter, 2-gap	Integer vertical-break and center-break	2	SA-40317	SA-43828-A	SA-43828-1-A
Interrupter, 3-gap	Vertical-break and center-break	3	SA-40318	SA-43829-A	SA-43829-1-A

Table 12. Parts

Item	Catalog Number
SF ₆ reclamation tool—assists reclaiming SF ₆ from discontinued solder-seal interrupters. (Solder-seal interrupters have flat pressure-relief vent cover.) User-furnished SF ₆ reclamation equipment required	SXA-2213

Table 13. Mounting Pedestals and Anchor Bolts—For Mark V Circuit-Switchers

Item	For Circuit-Switcher		Phase Spacing, Inches (mm)	Column Section, Inches (mm)	Column Height ^① , Feet (mm)	Catalog Number	Anchor Bolts ^{②③}	
	Style	Rating, kV					Qty. Req'd.	Catalog Number
Mounting pedestals (one per set), single rectangular tubular column, formed steel plate construction, galvanized finish	Integer ^④	34.5 thru 69 1 and 2 gaps	●	10×18 (254×457)	8 (2438)	92450R1-G	4	S-81365-2
					9 (2743)	92451R1-G		
					10 (3048)	92452R1-G		
					11 (3353)	92453R1-G		
					12 (3658)	92454R1-G		
Mounting pedestals, set of two, square steel tube construction, complete with Circuit-Switcher support frame, galvanized finish	Vertical-break and center-break	69 thru 115 1 and 2 gaps	96 (2438)	12×12 (305×305)	8 (2438)	90100R1-G	8	S-81365-1
					9 (2743)	90101R1-G		
					10 (3048)	90102R1-G		
					11 (3353)	90103R1-G		
					12 (3658)	90104R1-G		
	Vertical-break	138 1, 2, and 3 gaps	96 (2438)	12×12 (305×305)	8 (2438)	90100R1-G		
					9 (2743)	90101R1-G		
					10 (3048)	90102R1-G		
					11 (3353)	90103R1-G		
					12 (3658)	90104R1-G		
	Center-break ^⑤	138 1, 2, and 3 gaps	108 (2743)	12×12 (305×305)	8 (2438)	90120R1-G		
					9 (2743)	90121R1-G		
					10 (3048)	90122R1-G		
					11 (3353)	90123R1-G		
					12 (3658)	90124R1-G		
	Vertical-break	161 2 and 3 gaps	108 (2743)	12×12 (305×305)	8 (2438)	90120R1-G	8	S-81365-2
					9 (2743)	90121R1-G		
				14×14 (356×356)	10 (3048)	90132R1-G		
					11 (3353)	90133R1-G		
					12 (3658)	90134R1-G		
	Vertical-break and center-break	161 2 and 3 gaps	123 (3124)	12×12 (305×305)	8 (2438)	90140R1-G	8	S-81365-1
					9 (2743)	90141R1-G		
				14×14 (356×356)	10 (3048)	90152R1-G		
					11 (3353)	90153R1-G		
					12 (3658)	90154R1-G		
Mounting pedestals, set of six, square steel tube construction galvanized finish	Center-break	230 3 gaps extruded-aluminum weldment bases	Not applicable	12×12 (305×305)	8 (2438)	90180R1-G	24	S-81365-2
					9 (2743)	90181R1-G		
					10 (3048)	90182R1-G		
					11 (3353)	90183R1-G		
		345 3 gaps aluminum-sheathed steel weldment bases	Not applicable	16×16 (406×406)	10 (3048)	90162R3-G	24	S-81365-3
					11 (3353)	90163R3-G		
					12 (3658)	90164R3-G		

① Mounting pedestals of less than 12-foot (366-cm) column height may be furnished in intermediate heights—in 3-inch (76-mm) increments, as shown in the table below. Add the appropriate suffix to the mounting pedestal set catalog number.

Additional Column Heights, Inches (mm)	Mounting Pedestal Catalog Number Suffix
3 (76)	-S3
6 (152)	-S6
9 (229)	-S9

NOTE: Maximum standard column height is 12 feet (366 cm).

② Each anchor bolt is of galvanized steel and is furnished with two hex nuts and two flat washers to facilitate leveling the mounting pedestals.

③ Nominal sizes of anchor bolts are as follows, in inches:

S-81365-1: 1×33

S-81365-2: 1¼×44

S-81365-3: 1½×55

④ If mounting pedestals are to be used with integer-style circuitswitchers that are equipped with the shunt-trip device, add suffix “-T” to the catalog number.

⑤ Vertical-break style circuit-switchers, one, two, or three gaps, rated 138 kV, will also fit these mounting pedestals.

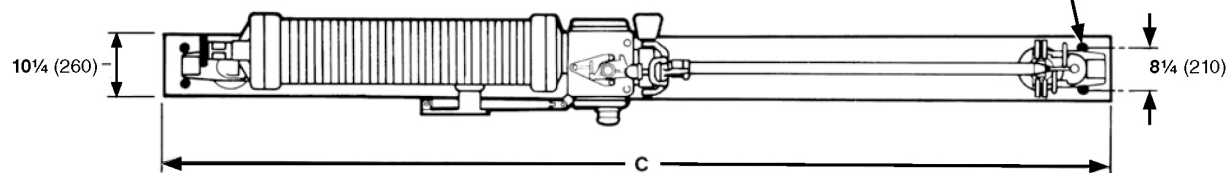
Phase spacing for integer-style circuit-switchers is fixed by the dimensions of the mounting frame and is 41 inches (104 cm) for circuit-switchers rated 34.5 kV and 46 kV, and 51 inches (130 cm) for circuit-switchers rated 69 kV.

Dimensional Drawings

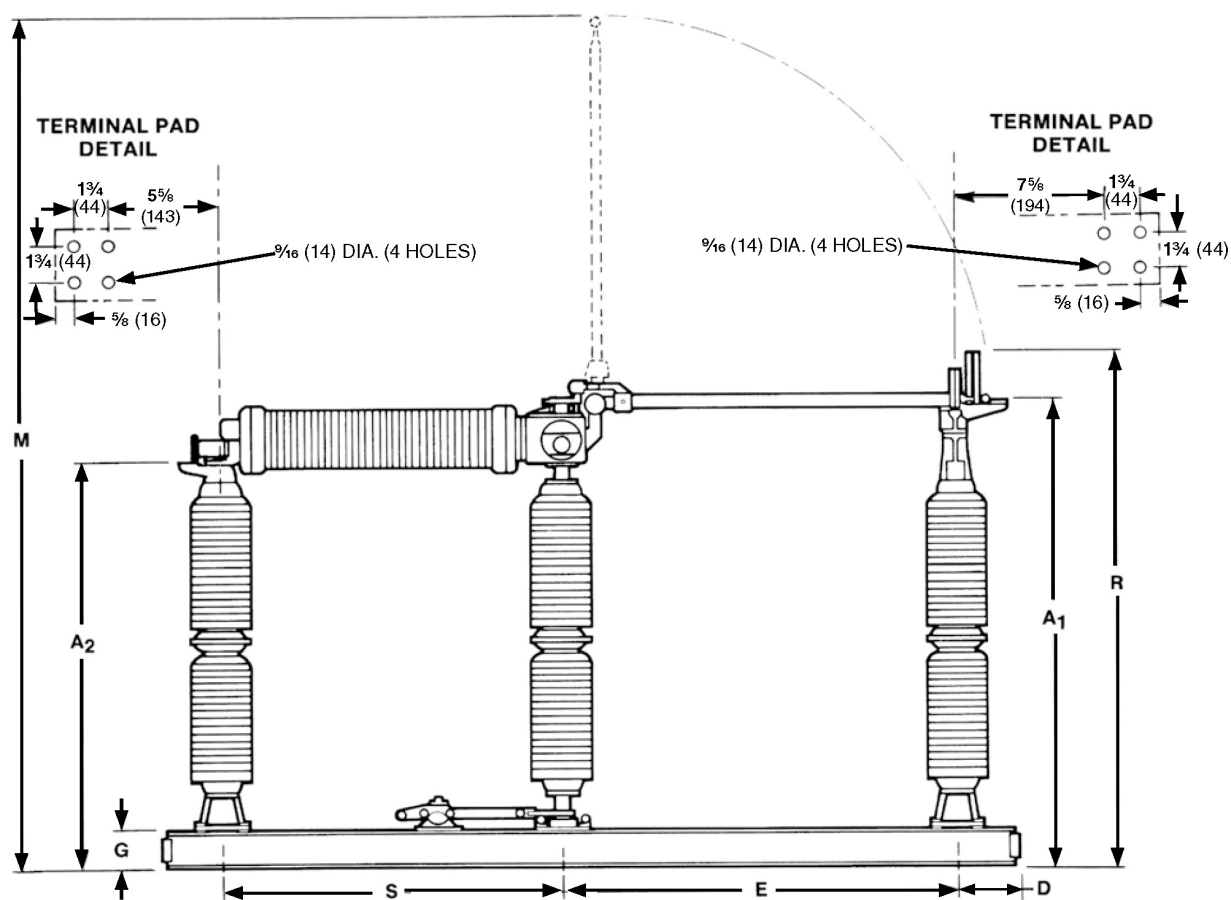
Three-Pole Vertical-Break Style 34.5 kV through 161 kV

Dimensions in inches (mm)

MOUNTING HOLES PREPUNCHED
IN BASE TO SUIT APPLICATION



POLE-UNIT TOP VIEW



POLE-UNIT SIDE VIEW

Catalog Number ②③④	Dimensions in Inches (mm)									Net Wt. per Pole-Unit, Lbs. (kg)
	A1	A2	C	D	E	G	M	R	S	
157314	46½ (1181)	34¾ (873)	96 (2438)	11⅝ (283)	29 (737)	6 (152)	74¼ (1886)	56¼ (1429)	44¾ (1137)	680 (308)
157315	50½ (1283)	38¾ (975)	104 (2642)	13⅝ (333)	33 (838)	6 (152)	82¼ (2089)	60¼ (1530)	44¾ (1137)	740 (336)
157316	58½ (1486)	46¾ (1178)	110 (2794)	11⅝ (283)	43 (1092)	6 (152)	100¼ (2546)	68¼ (1734)	44¾ (1137)	850 (386)
157326	58½ (1486)	46¾ (1178)	118 (2997)	11⅝ (283)	43 (1092)	6 (152)	100¼ (2546)	68¼ (1734)	52⅞ (1343)	890 (404)
157318	75¾ (1921)	63½ (1613)	128 (3251)	11⅝ (283)	61 (1549)	7 (178)	136¾ (3464)	85¾ (2169)	44¾ (1137)	1145 (519)
157328	75¾ (1921)	63½ (1613)	138 (3505)	12⅝ (308)	61 (1549)	7 (178)	136¾ (3464)	85¾ (2169)	52⅞ (1343)	1185 (538)
157329	84¾ (2149)	72½ (1842)	146 (3708)	11⅝ (283)	71 (1803)	7 (178)	155¾ (3947)	94¾ (2397)	52⅞ (1343)	1275 (578)
157369	84¾ (2149)	72½ (1842)	165 (4191)	11⅝ (283)	71 (1803)	7 (178)	155¾ (3947)	94¾ (2397)	71½ (1816)	1390 (630)
157320	92¾ (2353)	80½ (2045)	154 (3912)	11⅝ (283)	79 (2007)	7 (178)	171¾ (4353)	102¾ (2600)	52⅞ (1343)	1375 (624)
157360	92¾ (2353)	80½ (2045)	173 (4394)	11⅝ (283)	79 (2007)	7 (178)	171¾ (4353)	102¾ (2600)	71½ (1816)	1490 (676)

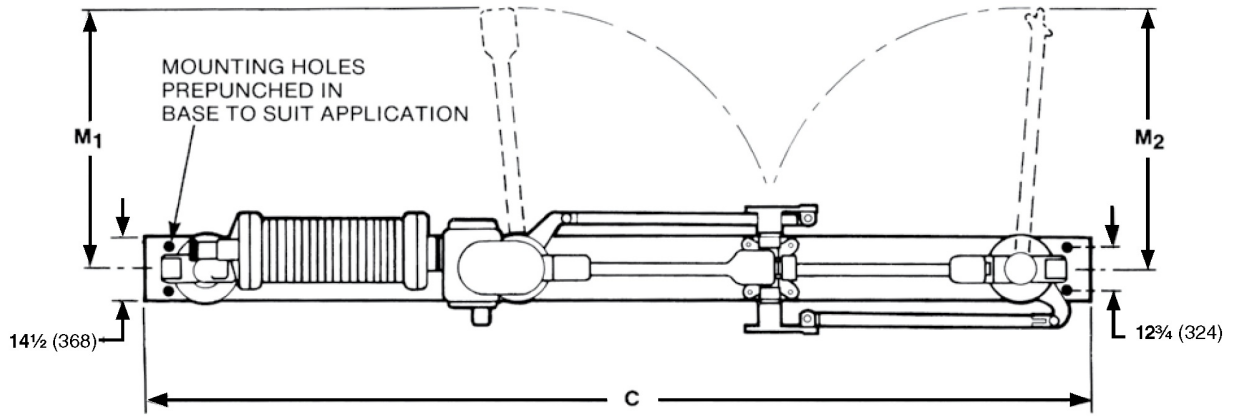
② Connectors not included. For available connectors refer to Table 8 on page 14. Circuit-Switchers are furnished with gray (Munsell Number 5 BG 7.0/014) station post insulators.

③ Manual operating handle not included. (See Table 9 on page 15.)

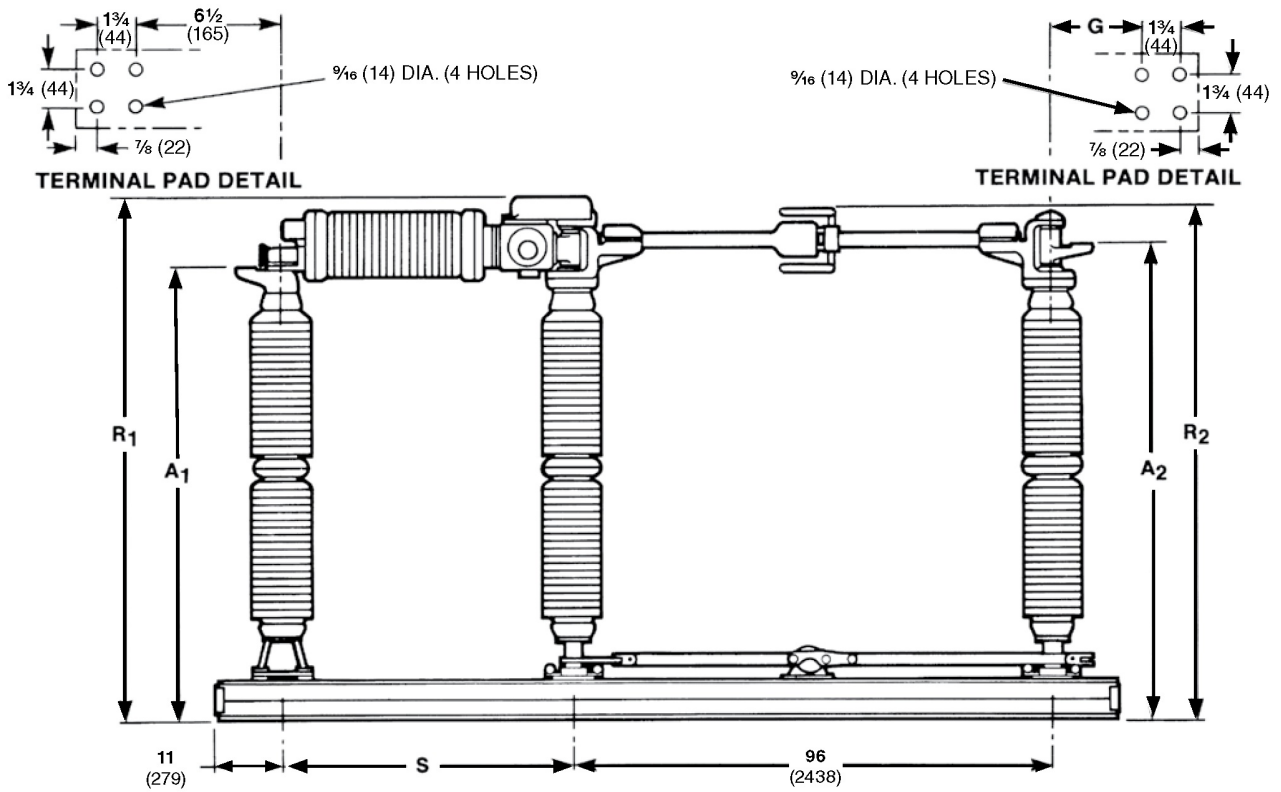
④ Shunt-trip device is available with all power-operated vertical-break style Mark V Circuit-Switchers.

Three-Pole Center-Break Style with extruded-aluminum weldment bases 230 kV

Dimensions in inches (mm)



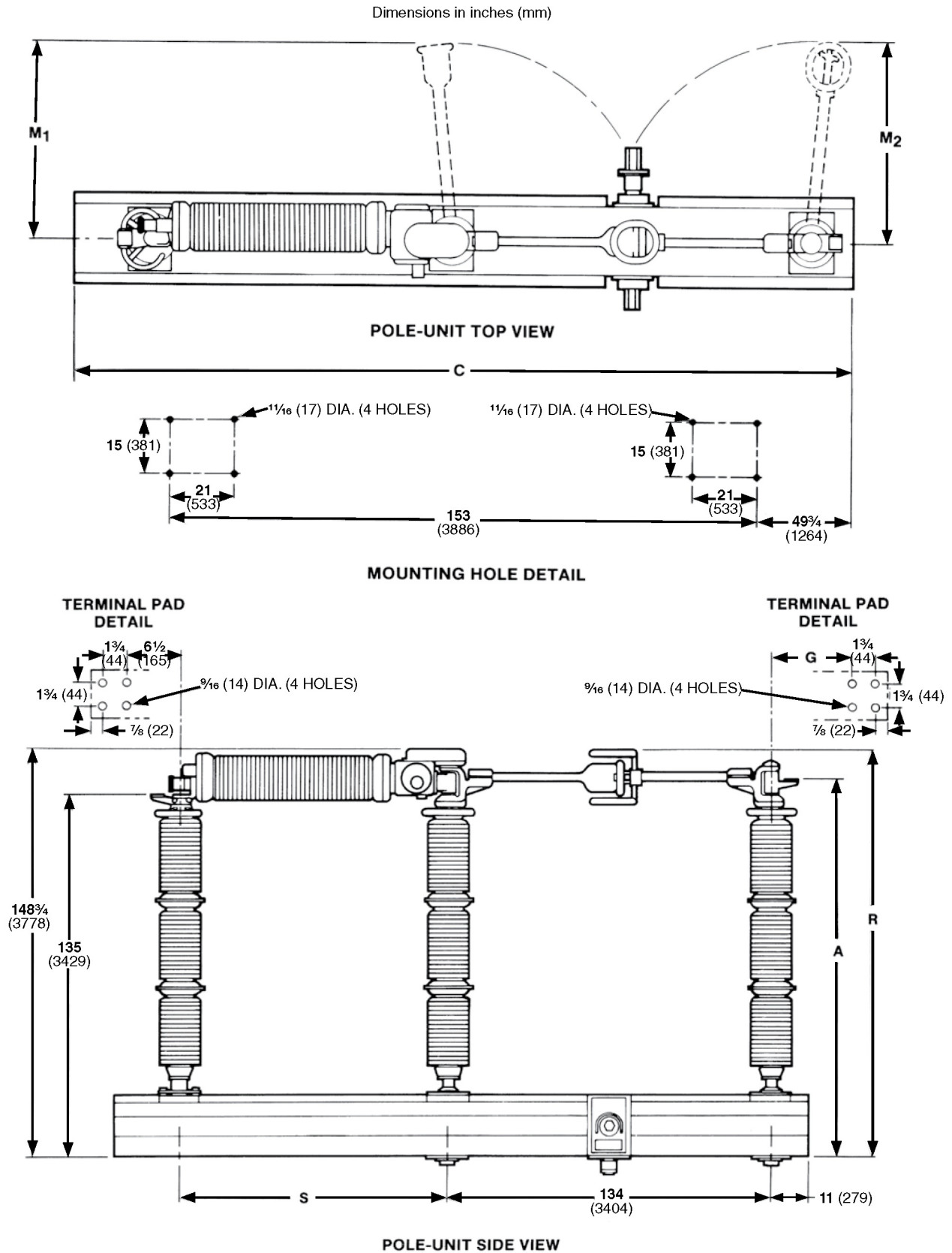
POLE-UNIT TOP VIEW



POLE-UNIT SIDE VIEW

Catalog Number ②③④⑤⑥	Dimensions in Inches (mm)									Net Wt. per Pole-Unit, Lbs. (kg)
	A1	A2	C	G	M1	M2	R1	R2	S	
657361R2	99 (2515)	103 (2616)	197 (5004)	5 (127)	51 3/4 (1314)	54 1/2 (1384)	112 3/4 (2864)	112 1/2 (2858)	79 1/2 (2019)	1850 (839)
757361R2	100 1/4 (2546)	104 1/2 (2654)	201 (5105)	7 1/2 (191)	51 1/4 (1302)	56 1/4 (1429)	114 (2896)	114 1/4 (2902)	83 1/2 (2121)	1958 (888)

Three-Pole Center-Break Style with aluminum-sheathed weldment bases 345 kV



Catalog Number②③④⑤	Dimensions in Inches (mm)							Net Wt. per Pole-Unit, Lbs. (kg)
	A	C	G	M1	M2	R	S	
357363	139 (3531)	231 (5867)	5 (127)	70¾ (1797)	74½ (1892)	150½ (3823)	79½ (2019)	4775 (2166)
557363	140¼ (3562)	235 (5969)	7½ (191)	71¼ (1810)	78⅞ (2003)	152 (3861)	83½ (2121)	4900 (2223)

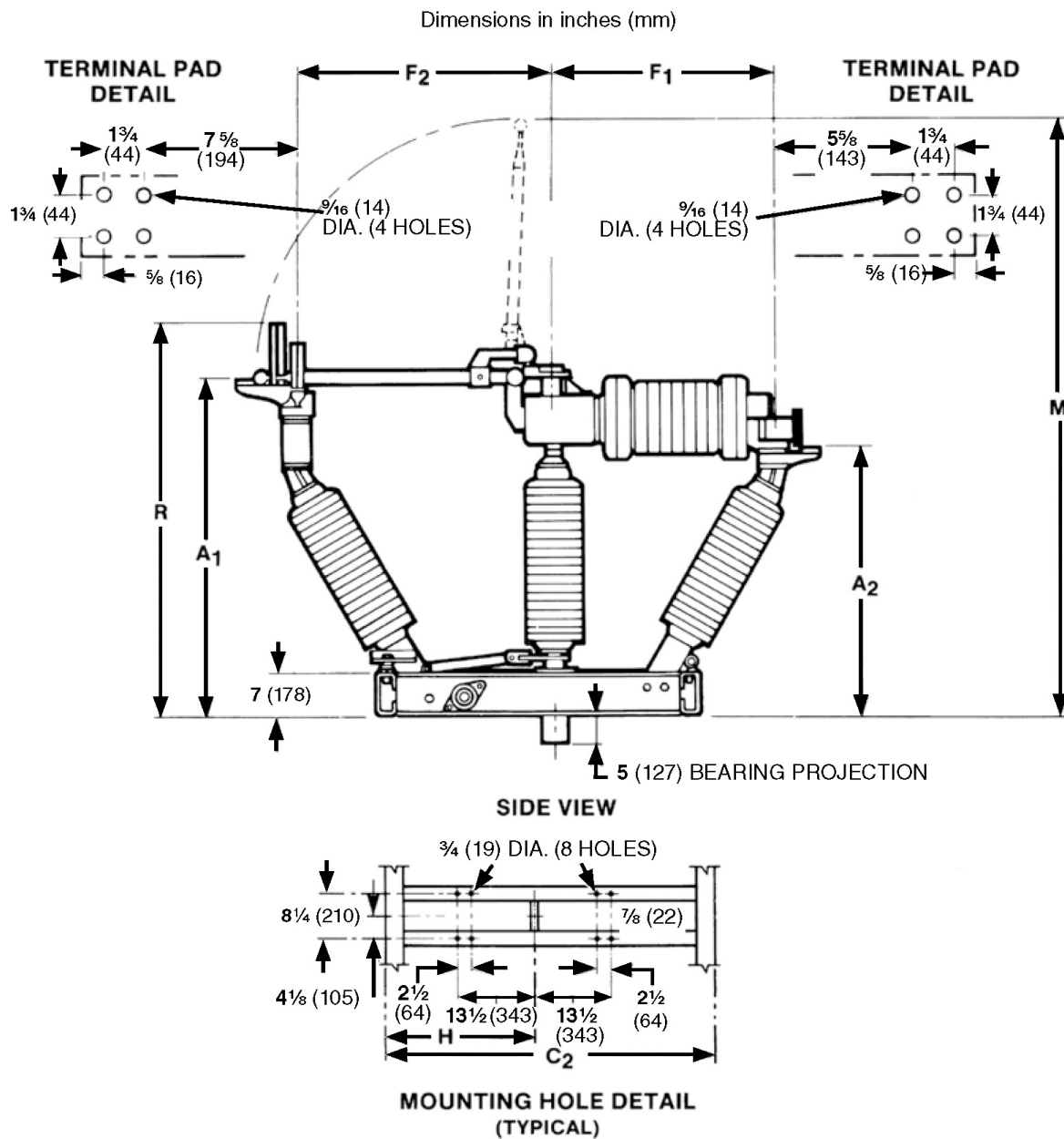
② Connectors not included. For available connectors refer to Table 8 on page 14. Circuit-switchers are furnished with gray (Munsell Number 5 BG7.0/014) station post insulators.

③ These circuit-switchers cannot be furnished with manual operating handle.

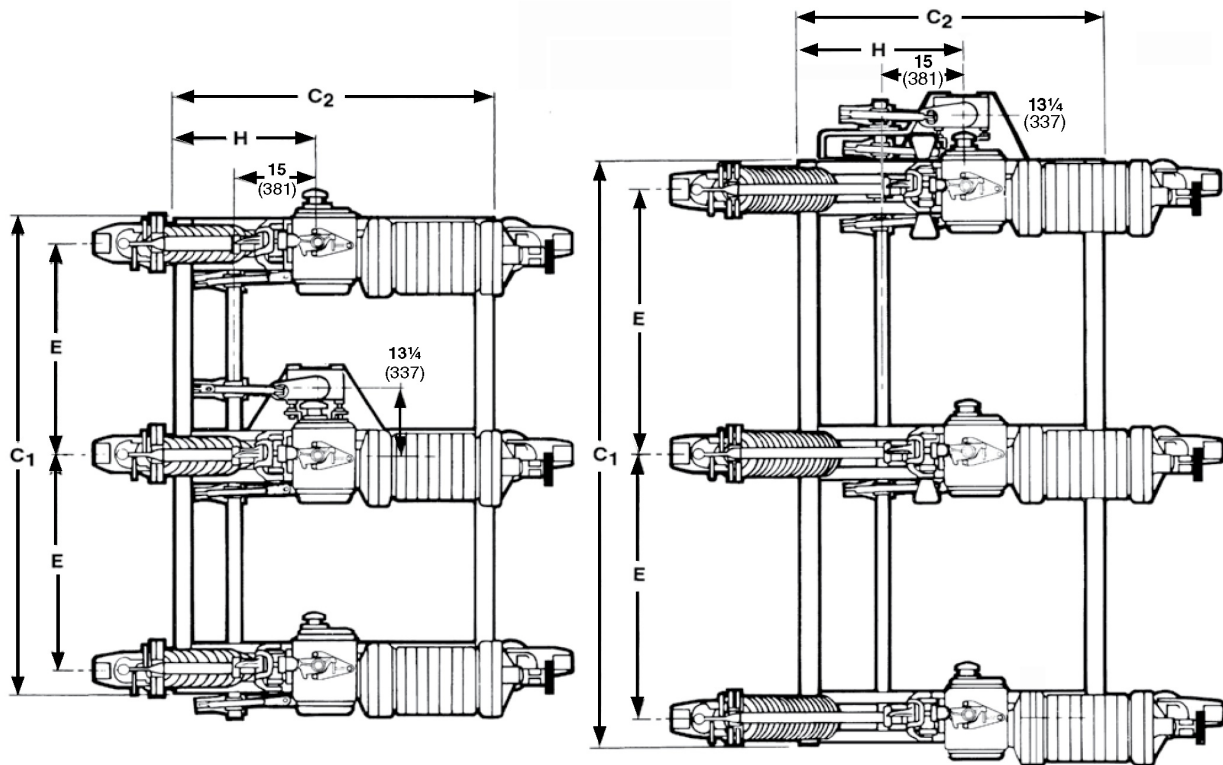
④ Shunt-trip device is available with all power-operated center-break style Mark V Circuit-Switchers.

⑤ For center-break style circuit-switchers, blade opening direction, as viewed from interrupter end, is to the left.

Three-Pole Integer Style 34.5 kV through 69 kV



Dimensions in inches (mm)



ILLUSTRATED
34.5-kV AND 46-kV
INBOARD OPERATING SHAFT

ILLUSTRATED
69-kV OUTBOARD OPERATING SHAFT

TOP VIEW

Catalog Number ②③④⑤		Dimensions in Inches (mm)										Net Wt. per Integer-Unit, Lbs. (kg)
Vertical Operating Shaft Inboard	Vertical Operating Shaft Outboard on Right⑤	A1	A2	C1	C2	E	F1	F2	H	R	M	
157914	157814	44 3/4 (1137)	32 5/8 (829)	92 (2337)	57 1/2 (1461)	41 (1041)	37 1/4 (946)	29 (737)	26 (660)	54 1/2 (1384)	72 1/2 (1842)	2250 (1021)
157915	157815	48 3/4 (1238)	36 5/8 (930)	92 (2337)	57 1/2 (1461)	41 (1041)	37 1/4 (946)	33 (838)	26 (660)	58 1/2 (1486)	80 1/2 (2045)	3040 (1379)
157916	157816	56 3/4 (1441)	44 5/8 (1133)	112 (2845)	55 (1397)	51 (1295)	37 1/4 (946)	43 (1092)	30 1/2 (775)	66 1/2 (1689)	98 1/2 (2502)	3250 (1474)
157926	157826	56 3/4 (1441)	44 5/8 (1133)	112 (2845)	62 (1575)	51 (1295)	52 7/8 (1343)	43 (1092)	30 1/2 (775)	66 1/2 (1689)	98 1/2 (2502)	3600 (1633)

② Connectors not included. For available connectors refer to Table 8 on page 14. Circuit-Switchers are furnished with gray (Munsell Number 5 BG7.0/014) station post insulators.

③ Manual operating handle not included. (See Table 9 on page 15.)

④ Shunt-trip device is available with all power-operated vertical-break style Mark V Circuit-Switchers.

⑤ As viewed from interrupter end.

Circuit-Switcher Style and Rating	Static and Dynamic Loading Specifications
Vertical-break, 34.5 through 161 kV	Data Sheet 711-300
Center-break, 230 kV: extruded-aluminum weldment base	Data Sheet 711-301
Center-break, 345 kV: aluminum-sheathed steel weldment base	Data Sheet 711-302
Integer, 34.5 through 69 kV	Data Sheet 711-303

Specifications

- Product Name: Mark V Circuit-Switchers Outdoor Transmission
- Voltage Range: 34.5 kV through 345 kV

June 9, 2025

© S&C Electric Company 1979–2025, all rights reserved

FAQ

Q: What is the voltage range for the Mark V Circuit-Switchers?

A: The voltage range for the Mark V Circuit-Switchers is from 34.5 kV through 345 kV.

Q: Are connectors included with the Circuit-Switchers?


A: No, Mark V Circuit-Switchers do not include connectors.

Various connectors are available separately.

Q: What is required for high-speed tripping of power-operated Circuit-Switchers?

A: An optional S&C Shunt-Trip Device needs to be added along with the Type CS-1A Switch Operator if the shunt-trip device is specified.

Documents / Resources

	<p>SandC Mark Circuit Switcher Switching and Protection [pdf] Instruction Manual</p> <p>Mark Circuit Switcher Switching and Protection, Switcher Switching and Protection, Switching and Protection, and Protection</p>
---	---

References

- [User Manual](#)

Related Posts



[wea UMBW-UL489 and UL1077 Circuit Protection User Guide](#)

wea UMBW-UL489 and UL1077 Circuit Protection
UMBW-UL489 and UL1077 Listed Introducing the New

WEG UMBW Series Thermal-Magnetic Miniature...



[cnw MCB Low voltage circuit protection switch gear User Manual](#)

cnw MCB Low voltage circuit protection switch gear
Quicklag accessories Quicklag's extensive range of
accessories extends its features...



[Schneider Electric GV2ME20 Circuit Breaker, Motor Protection User Manual](#)

Schneider Electric GV2ME20 Circuit Breaker, Motor
Protection Schneider Electric Industries Date: Sunday,
July 3, 2022 Reach Project Dear...



[BG ELECTRICAL CFUFS100-01 Fortress Circuit Protection Instruction Manual](#)

BG ELECTRICAL CFUFS100-01 Fortress Circuit

Protection Safety Warning For your safety, this product must be installed in accordance...

■ SandC

◆ And Protection, Mark Circuit Switcher Switching and Protection, SandC, Switcher Switching and Protection, Switching and Protection

Leave a comment

Your email address will not be published. Required fields are marked *

Comment *

Name

Email

Website

☐ Save my name, email, and website in this browser for the next time I comment.

Post Comment

Search:

e.g. whirlpool wrf535swhz

Search

[Manuals+](#) | [Upload](#) | [Deep Search](#) | [Privacy Policy](#) | [@manuals.plus](#) | [YouTube](#)

This website is an independent publication and is neither affiliated with nor endorsed by any of the trademark owners. The "Bluetooth®" word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. The "Wi-Fi®" word mark and logos are registered trademarks owned by the Wi-Fi Alliance. Any use of these marks on this website does not imply any affiliation with or endorsement.