

## Specifications

### Conditions of Sale

**STANDARD:** The seller's standard conditions of sale as set forth in Price Sheets 150 and 181 apply, except as modified by the "Special Warranty Provisions" section on page 7.

### *Special to this product and associated services:*

**INCLUSIONS:** Scada-Mate SD switches are offered without control equipment and optional features such as a visible-break disconnect and sensors, allowing these switches to be tailored to a specific application and mounting arrangement.

A complete Scada-Mate SD Switching System for a remote supervisory control application includes a Scada-Mate SD switch, a control unit that provides an interface between the switch and the master station computer or peer-to-peer communication with distributed intelligence, and optional current and voltage sensors.

A complete Scada-Mate SD Switching System for an automatic source-transfer application includes two Scada-Mate SD switches, a source-transfer control unit, voltage sensors or voltage transformers, and optional current sensors.

### Scada-Mate SD Switches

Scada-Mate SD switches are three-pole, group-operated interrupter switches rated 900 amperes continuous and interrupting. They are offered in voltage ratings of 14.4 kV and 25 kV. Scada-Mate SD switches feature a five-time duty-cycle fault-closing rating of 12,500 amperes, RMS, symmetrical.

Circuit-making and circuit-breaking are accomplished internally within a vacuum interrupter bottle encapsulated in a solid dielectric S&C Cypoxy™ Insulator module. Interrupter position is clearly visible on the OPEN/CLOSED indicator on the side of the switch.

Scada-Mate SD switches are specifically designed for automation of overhead distribution systems. They are factory-assembled on a one-piece base and include an integral stored-energy operating mechanism. In addition to electrically operating the interrupters, the operating mechanism provides nonelectrical mechanical opening and closing of the interrupters by means of a manual-operation pull-ring. The switch can be locked open to prevent electrical or manual closing.

Scada-Mate SD switches are available in compact-crossarm upright and compact-crossarm tiered outboard models. All models feature Cypoxy Insulators.

Arrester mounting brackets are provided as standard on one side of the switch. A single-point integral lifting tab is provided for convenient rigging and hoisting. Scada-Mate SD switches are shipped in heat-treated (kiln-dried) wooden crates.

### Remote Supervisory Control Applications

Three control units are available for remote supervisory control applications to accommodate different automation approaches and strategies. Alternately, a switch-control unit can be furnished, providing local pushbutton control of the Scada-Mate SD switch. See Table 3 on page 11.

### Communication and Control Unit—Externally Powered

This custom-engineered control includes the following:

- A customer-specified remote terminal unit
- A customer-specified communication device
- A switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, a LOCAL/REMOTE switch, and an operation counter



- A high-output temperature-compensated constant-voltage battery charger with a unique battery-management system powered by a customer-supplied 120-Vac source (Integral load-disconnect circuitry prevents deep discharge of batteries on loss of ac source. Alarms occur on loss of ac source, battery low voltage, or charger overvoltage. The battery load test feature works in conjunction with a suitably equipped remote terminal unit (RTU).)
- Rechargeable sealed-lead starved-electrolyte battery packs
- Any other electrical components required for the specific application
- A easy-to-install 316L stainless steel enclosure

### Communication and Control Unit—Self-Powered

This custom-engineered control includes the following:

- A customer-specified remote terminal unit
- A customer-specified communication device
- A switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, a LOCAL/REMOTE switch, and an operation counter
- A temperature-compensated constant-voltage battery charger powered by S&C Current/Voltage Sensors (Integral load-disconnect circuitry prevents deep discharge of batteries on loss of ac source. Alarms occur on loss of ac source, battery low voltage, or charger overvoltage. The battery load test feature works in conjunction with a suitably equipped RTU.)
- Rechargeable sealed-lead starved-electrolyte battery packs
- Any other electrical components required for the specific application
- An easy-to-install 316L stainless steel enclosure

### S&C 6801 Automatic Switch Control

This fully integrated package includes the following:

- A sophisticated RTU functionality, including remote reporting of switch status points and switch operations, as well as current, voltage, watts, and vars via a variety of protocols (Also includes automatic sectionalizing on overcurrent, loss of voltage, or

phase unbalance; overcurrent fault detection; selectable shots-to-lockout; and extensive data-logging capability.)

- A customer-specified communication device
- A faceplate with a liquid-crystal display for viewing real-time data, settings, and fault events (It also includes touch switches, operation and diagnostic indicating lamps, and a USB local communication port.)
- A high-output temperature-compensated constant-voltage battery charger with a unique battery management system powered by three S&C Current/Voltage Sensors or customer-supplied 120-Vac source (Integral load-disconnect circuitry prevents deep discharge of batteries on loss of ac source. Alarms occur on loss of ac source, battery low voltage, or charger overvoltage. Includes an intelligent, micro-processor-controlled battery test feature.)
- Rechargeable sealed-lead starved-electrolyte battery packs
- A compact easy-to-install aluminum enclosure
- Any other electrical components required for the specific application

The 6801 Automatic Switch Control supports the IntelliTeam® SG Automatic Restoration System, which uses peer-to-peer communication and distributed intelligence to make operating decisions. No central processing or SCADA is required, though both are fully supported.

### Switch Control Unit

This device provides local pushbutton control only. It includes the following:

- A switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, a LOCAL/REMOTE switch, and an operation counter
- A temperature-compensated constant-voltage battery charger powered by S&C Current/Voltage Sensors or a customer-supplied 120-Vac source (Integral load-disconnect circuitry prevents deep discharge of batteries on loss of ac source. Alarms occur on loss of ac source, battery low voltage, or charger overvoltage. A battery load test feature works in conjunction with a suitably equipped customer-supplied RTU, which must be installed in a customer-supplied enclosure.)

- Rechargeable sealed-lead starved-electrolyte battery packs
- A terminal strip for connection of external control power input (if required), remote **Open/Close** command inputs, current and voltage sensor outputs, and a remote interrupter-position indication output
- A surge protector for external control power input
- An easy-to-install 316L stainless steel enclosure

### **Automatic Source-Transfer Applications**

In automatic source-transfer applications, a source-transfer control unit is required to provide a complete switching system. Excluding any intentional time delay to coordinate with upstream protective devices and/or transition dwell time, transfer is achieved in 90 cycles maximum.

### **S&C 6802 Automatic Switch Control**

This fully integrated package includes the following:

- Sophisticated RTU functionality, including remote reporting of switch status points and switch operations via a variety of protocols, including DNP 3.0, as well as data-logging capability
- A faceplate with a liquid-crystal display for viewing real-time data, settings, and fault events—plus touch switches, operation and diagnostic indicating lamps, and a USB local communication port
- A high-output, temperature-compensated constant-voltage battery charger with a unique battery-management system powered by S&C Current/Voltage Sensors (Integral load-disconnect circuitry prevents deep discharge of batteries on loss of ac source. Alarms occur on loss of ac source, battery low voltage, or charger overvoltage. Includes an intelligent, microprocessor-controlled battery test feature.)
- Rechargeable sealed-lead starved-electrolyte battery packs
- A compact easy-to-install aluminum enclosure

The 6802 Automatic Switch Control may optionally be furnished with the following:

- An IntelliTeam SG Automatic Restoration System
- IntelliLink® Setup Software
- A customer-specified communication device
- The 6802 control automatically records system status every time a control operation occurs. Events can be viewed on the display or be uploaded to a personal computer; 64 events are stored in memory.

### **Sensors**

All sensors are of molded Cypoxy Insulator construction and serve as support insulators for the switch live parts, thereby eliminating the cost, clutter, and complexity associated with separately mounted sensors. Sensing options include three-phase S&C Current Sensors on the pole-saddle side of the switch, and three-phase S&C Current/Voltage Sensors on the pole-saddle side and the front side of the switch. Refer to Table 4 on page 12.

### **Equipment/Services Packages**

Complete equipment/services packages are available for three- through 12-member Scada-Mate SD switch teams, as listed in Table 5 on page 13. Each team member includes a 6801 Automatic Switch Control with the IntelliTeam SG Automatic Restoration System.

Each package includes the following services:

- A communication site survey
- IntelliTeam SG system factory acceptance testing
- IntelliTeam SG system training
- IntelliTeam SG system commissioning

## Services-Only Packages

Services-only packages are also available for Scada-Mate SD switches, as listed in Table 6 on page 13. Offerings include:

- Communication site surveys
- IntelliTeam SG system device settings determination
- IntelliTeam SG system factory acceptance testing
- IntelliTeam SG system training
- IntelliTeam SG system commissioning
- IntelliTeam SG system SCADA integration
- IntelliTeam SG system monitoring
- Scada-Mate SD Switching System maintenance
- Scada-Mate SD Switching System project and construction management

## Communication Site Surveys

A communication site survey is required for new IntelliTeam SG system applications and is critical to ensure acceptable signal strength between the switches in the team and the head-end SCADA radio, if applicable. A site survey includes:

- An engineering review of selected team-member sites that considers distance, topological constraints, and other factors that can affect signal strength
- An on-site survey of team-member sites to confirm feasibility and, if necessary, determination of alternative sites that will provide better signal strength
- A detailed report defining the GPS coordinates of all team and repeater radios
- Establishment of baseline communication statistics for monitoring communication system performance

The user will need to supply a line truck and the engineer/technician responsible for the project.

The site survey ensures optimal communication when the system is commissioned. However, building construction, relocation of lines, vegetation growth, and other factors can degrade communication over time. A subsequent “tune-up” site survey may be desirable.

## IntelliTeam SG System Device Settings Determination

Appropriate device settings are essential to the successful implementation of IntelliTeam SG system software. These settings must be documented before factory acceptance testing and commissioning of IntelliTeam SG system software.

## IntelliTeam SG System Factory Acceptance Testing

Factory acceptance testing ensures all information required for a successful IntelliTeam SG system software implementation is gathered and understood before commissioning, and it is strongly recommended if there are any unusual system characteristics or loading limitations. It provides significant insight on how IntelliTeam SG system software will work on the user's system—with the user's specific system-protection settings, available fault currents, connected loads, etc. To perform this testing, the user must furnish the following:

- Substation breaker data, including overcurrent pickup levels and relay timer settings
- Any substation capacity limitations, conductor loading limitations, or system operating rule limitations
- A written description of the desired system functionality
- A single-line diagram of the circuits on which IntelliTeam SG system software will be applied
- Completed IntelliTeam SG settings sheets (Determination of device settings is the customer's responsibility, or S&C can provide it.)

Factory acceptance testing is performed at S&C's IntelliLab facility in Chicago. S&C will provide a detailed test plan. After testing has been completed, the user will receive a CD-ROM containing the results of each simulation, which they can use for training.

## IntelliTeam SG System Training

IntelliTeam SG system training is conducted on site and ensures the user's personnel fully understand IntelliTeam SG system functioning. Both operations and engineering sessions are provided.

Operations training is designed for persons who will encounter the equipment in the field, dispatch personnel, or create switching orders. A typical agenda includes:

- IntelliTeam SG system software—what it is, how it works, and examples
- Operation of Scada-Mate SD switches and 6801 Automatic Switch Controls in an IntelliTeam SG system
- Real-world examples of IntelliTeam SG system operation using IntelliTeam Designer in **Instant Replay** mode

Engineering training is designed for engineers and technicians who will configure the controls and radios. A typical agenda includes:

- A detailed look at how the IntelliTeam SG system works
- An explanation of all control settings
- Software screens useful for troubleshooting
- Configuration of the radios
- Creation of a DNP lookup table

## IntelliTeam SG System Commissioning

IntelliTeam SG system commissioning ensures the Scada-Mate SD switches in the team have been set up correctly and are ready to be put into service. These services include:

- Assistance with configuring the 6801 Automatic Switch Controls and radios (Determination of device settings is the customer's responsibility, or S&C can provide it.)
- Verification of acceptable peer-to-peer communication
- Verification of acceptable communication with the SCADA system

- Checking each Scada-Mate SD switch and 6801 Automatic Switch Control for conformance with installation recommendations
- Verification each team is capable of achieving **Ready** status (Upon user request, the teams will be disabled after verification.)

## IntelliTeam SG SCADA Integration

If IntelliTeam SG system software is to communicate with a SCADA system, integration services may be desirable. These services include:

- Working with the SCADA supplier
- Designing and installing the communication infrastructure linking the IntelliTeam SG system with the user's LAN
- Developing the protocol conversion necessary to change DNP into the native language of the SCADA master
- Developing optimal SCADA settings and a polling sequence

## IntelliTeam SG System Monitoring

Ongoing remote system monitoring ensures IntelliTeam SG system operation meets agreed-upon service levels. It requires a SpeedGate™ Radio Interface System with a wireless telephone modem. If wireless telephone service is not available, a telephone modem and a user-supplied telephone line must be installed at the SpeedGate Radio Interface System.

System monitoring allows S&C's engineers to assist with any required troubleshooting, update configurations, and provide weekly "health reports" on the status of the system. Such reports can include:

- Team Ready status
- IntelliTeam SG system operational status
- Battery system status
- Active trouble conditions or alarms

The scope and format of the reports can be customized to meet specific user needs.



## Scada-Mate SD Switching System Maintenance

Scada-Mate SD Switching System maintenance includes periodic field inspection and testing of the switch and control unit on a three-year interval. Services provided for each team member include:

- A visual inspection of the switch, control unit, control cable, antenna, grounding, arresters, and wiring connections
- Verification of control unit processor operation
- A full report downloaded from the control unit, review of the data, and execution of any corrective actions necessary
- Replacement of the battery
- Operation of the switch (if it can be bypassed or operated decoupled): locally, manually, and from SCADA
- Inspection of the repeater radio and replacement of its battery
- Monitoring of communication statistics and a comparison against the initial baseline (identification of recommended communication enhancements)

All system maintenance is coordinated with the user's designee. To facilitate the inspection process and ensure consistent and accurate reporting, S&C will work with the designee to develop an inspection checklist and train inspection crews on its importance and use.

## Scada-Mate SD Switching System Project and Construction Management

S&C's highly trained, experienced staff will assist the user's automation team in the areas of project and construction management, working closely with them to ensure on-time completion of the project. Services may include working with the user's contractor or crew to:

- Ensure proper installation of the Scada-Mate SD switches and control units
- Supply the automation system as a complete turnkey project

**EXCLUSIONS:** Scada-Mate SD switches do not include terminal-pad connectors. Various connectors are available, as listed in Table 7 on page 14. Equipment/services packages and services-only packages do not include field installation or construction labor.

Switches specified with option suffix “-M” do not include an integral motor-operated stored-energy mechanism. Instead, they include a factory-adjusted spring-wound hookstick operating mechanism. An automated motor can be retrofitted to this switch to allow future automation for remote control.

For non-IntelliTeam SG system applications, S&C may be able to furnish and install in the communication and control unit or a 6801 Automatic Switch Control a customer-specified communication device, as indicated in Table 3 on page 11. S&C will need to evaluate the physical and electrical requirements of the communication device and its performance characteristics and conduct qualification testing to verify its suitability for the desired application. Refer to the nearest S&C Sales Office for scheduling information. S&C cannot furnish or install any communication device for which the supplier requires S&C to offer Tier I (i.e., “help desk”) support.

Control units do not include the antenna. The antenna, antenna support, and coaxial feedline are to be provided by others. Propagation study, frequency selection, and FCC license application are also to be provided by others.

**APPLICATION NOTES:** System-voltage restrictions are applicable to the self-powered communication and control unit, 6801 and 6802 Automatic Switch Controls, and the switch control unit when powered by S&C Current/Voltage Sensors. For adequate power to be available for the voltage sensors, Scada-Mate SD switches must be applied on effectively grounded systems at line-to-line voltages in the ranges shown in Table 1. For applications at lower system voltages, refer to the nearest S&C Sales Office.

**Table 1. Line-to-Line Voltage Ranges**

kV, Nom., at 60 Hz	Range, kV, at 60 Hz <sup>①</sup>	Range, kV, at 50 Hz <sup>①</sup>
14.4	11.43 through 17.0	10 through 15
25	20.44 through 29	20 through 24

<sup>①</sup> Switches must be applied on effectively grounded systems at line-to-line voltages in the range specified by the minimum and maximum voltages shown. Refer to the nearest S&C Sales Office for applications on other than effectively grounded systems.

**Downed-conductor switching:** Scada-Mate SD switches are capable of interrupting low-magnitude fault currents of the type generally associated with downed overhead conductors. As reported in the literature●, the magnitude of a downed-conductor fault is essentially determined by the conductivity of the return path, which depends, to a large degree, on local conditions such as soil type, soil moisture, and the contact surface (asphalt, concrete, etc.). There is little correlation between the available fault current at the point of the fault and the actual fault current produced by the downed conductor, provided the downed conductor does not come in contact with a metallic return path, such as an adjacent phase conductor or the circuit neutral. Downed-conductor faults are highly resistive in nature and are typically less than 100 amperes in magnitude.

- The following publications are recommended:
1. *Downed Power Lines: Why They Can't Always be Detected.* A publication of the IEEE Power Engineering Society, The Institute of Electrical and Electronics Engineers, Inc., New York, February 22, 1989.
  2. IEEE Tutorial Course, "Detection of Downed Conductors on Utility Distribution Systems." Course Text No. 90EH0310-3-PWR. The Institute of Electrical and Electronics Engineers, Inc., New York, 1989.
  3. Lee, P.E., Robert E., "High Impedance Fault Detection." Presented to Edison Electric Institute, Transmission and Distribution Committee, Kansas City, October 19, 1989.

Downed and broken conductors on a main feeder can usually be identified by a significant reduction in the normal load current in the affected phase at the nearest Scada-Mate SD switch (if three-phase current sensing is provided) on the source side of the downed conductor and by the loss of current and voltage in the affected phase (if three-phase current/voltage sensing is provided) at the next load-side Scada-Mate SD switch. Downed *but not broken* conductors on a main feeder can usually be identified by erratic behavior of the load current in the affected phase at the nearest Scada-Mate SD switch on the source side of the downed conductor, and no loss of current and voltage at the next load-side Scada-Mate SD switch. Scada-Mate SD switches are capable of switching either of these fault types.

**Application of surge arresters:** Surge arresters are recommended on both sides of Scada-Mate SD switches to protect the switches from surges beyond their ratings. Scada-Mate SD switches include arrester mounting brackets on one side and can be optionally furnished with arrester mounting brackets on both sides.

**Resistively grounded systems.** Current/voltage sensors must have a ground reference to work properly, and the phase-to-ground voltage on all phases should be fairly well balanced (i.e., within 5% of each other). If the grounding resistance is relatively low—on the order of 300 to 500 ohms—this should not be a problem because the impedance of the sensors is quite high. But it is important that the system have a mechanism for sensing and removing ground faults fairly quickly. For example, if a wire comes down on the Scada-Mate SD switch base, the sensors will be exposed to line-to-line voltage until the phase is opened. While this may not cause damage for short periods of time, it could cause damage in the course of a day or so.

It is also important that the Scada-Mate SD switch base be very well grounded to provide a good ground reference for the sensors. Otherwise, erroneous readings could result. And, of course, short-circuits to an ungrounded or poorly grounded base might not clear very well, especially on a resistance-grounded system.

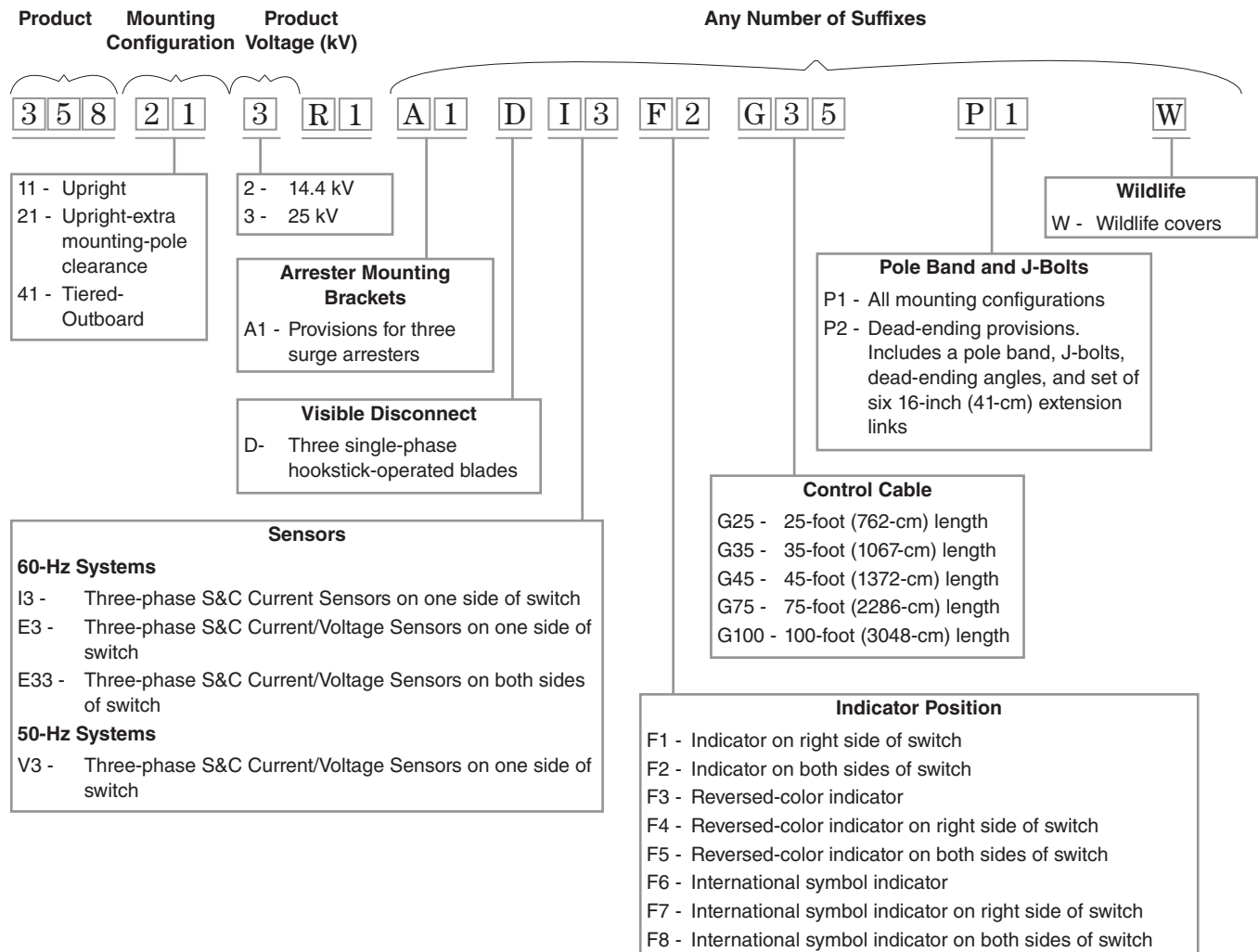
**SPECIAL WARRANTY PROVISIONS:** The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to Scada-Mate SD Switching Systems.

For equipment/services packages, the seller warrants, for a period of one year after commissioning, that the Scada-Mate SD Switching Systems will provide automatic fault isolation and system reconfiguration per agreed-upon service levels. The remedy shall be additional system analysis and reconfiguration of IntelliTeam SG system software until the desired result is achieved.



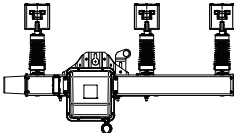
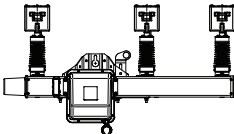



## Anatomy of a Scada-Mate® SD Switching System Catalog Number



The catalog number created above represents a 25-kV upright-extra mounting-pole clearance Scada-Mate SD switch. It comes with three arrester brackets for one side the switch, a manual disconnect, and wildlife protection. It also comes with a 60-Hz current sensor and voltage sensors on each side of the switch. To connect to the control unit, a 35-foot (10.7-m) cable option is chosen. A pole band and J-bolts are included.

**Table 2. Scada-Mate SD Switches**

Mounting Configuration	60-Hz Rating (50-Hz Rating in Parentheses)						Catalog Number	Page Number for Dimensional Information
	kV <sup>①</sup>			Amperes, RMS		Five-Time Duty-Cycle Fault Closing, Amperes, RMS, Symmetrical <sup>⑤</sup>		
	Nom.	Max	BIL	Cont. and Interr. <sup>② ③</sup>	Peak Withstand <sup>④</sup>			
<div>Compact-crossarm upright<sup>⑥</sup></div> 	14.4	17	110	900	41 600	12 500	358112R1	14
	(10)●	(15)	(110)	(900)	(41 600)	(12 500)		
	25	29	125■	900	41 600	12 500	358113R1	
	(20)●	(24)	(125)■	(900)	(41 600)	(12 500)		
<div>Compact-crossarm upright—extra mounting-pole clearance<sup>⑥</sup></div> 	14.4	17	110	900	41 600	12 500	358212R1	14
	(10)●	(15)	110	(900)	(41 600)	(12 500)		
	25	29	125■	900	41 600	12 500	358213R1	
	(20)●	(24)	(125)■	(900)	(41 600)	(12 500)		
<div>Compact-crossarm tiered outboard<sup>⑦</sup></div> 	14.4	17	110	900	41 600	12 500	358412R1	17
	(10)●	(15)	(110)	(900)	(41 600)	(12 500)		
	25	29	125■	900	41 600	12 500	358413R1	
	(20)●	(24)	(125)■	(900)	(41 600)	(12 500)		

① System voltage restrictions apply when the associated control unit is powered by S&C Current/Voltage Sensors. See the "Application Notes" section on page 6.

② For line or cable dropping, the following maximum conductor lengths apply: 50 miles (80.45 km) of line, 12 miles (19.31 km) of 1/0 cable, or 5 miles (8.05 km) of 1000 kc mil cable, or equivalent.

③ Switches can endure 3,500 operations of loop-current switching at 900 amperes.

④ The 1-second rating is 16,000 amperes, RMS, symmetrical.

⑤ The duty-cycle fault-closing rating defines the ability to close the switch the specified number of times against a three-phase fault with symmetrical current in at least one phase equal to the listed value, with the switch remaining operable and able to carry and interrupt rated continuous current.

⑥ Switches furnished with optional visible-break disconnect, catalog number suffix "-D," can carry up to 900 amperes continuous in ambient temperatures to 39°C (102°F) or 900 amperes continuous in ambient temperatures to 40°C (104°F) with a minimum wind velocity of 2 feet (61 cm) per second. Maximum allowable conductor temperature is 90°C (194°F).

⑦ Switches in the tiered-outboard mounting configuration are not available with the optional disconnect "-D."

● Minimum voltage rating.

■ The phase-to-ground BIL rating for the 25-kV Scada-Mate SD switch is 150 kV when the vacuum Interrupter is closed.

See table below for further clarification on the BIL rating for the 25-kV Scada-Mate SD Switching System:

Without Optional Disconnect		With Optional Disconnect	
Vacuum Interrupter	BIL	Optional Disconnect	BIL
Closed	150 kV	Open	150 kV
		Closed	150 kV
Open	125 kV	Closed	125 kV
Open	125 kV	Open	150 kV

**Note:** From IEC 60815-1 & IEC 60815-3, the Scada-Mate SD Switching System is rated to withstand a Very Heavy duty site-pollution severity class (SPS Class E - 53.7+ mm/kV, site-equivalent salinity above 112 kg/m<sup>3</sup>).

**Table 3. Control Units for Remote Supervisory Control Applications<sup>①</sup>**

Item	Catalog Number
Communication and control unit—externally powered. Powered by customer-supplied 120-Vac source. Includes customer-specified remote terminal unit and communication device; switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, LOCAL/REMOTE switch, and operation counter; high-output battery charger; and battery packs	●
Communication and control unit—self-powered. Powered by S&C Current/Voltage Sensors. Includes customer-specified remote terminal unit and communication device; switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, LOCAL/REMOTE switch, and operation counter; battery charger; and battery packs <sup>②③</sup>	
Model 6801 Automatic Switch Control. Powered by S&C Current/Voltage Sensors or customer-supplied 120-Vac source. Provides sophisticated RTU functionality. Includes customer-specified communication device; faceplate with liquid-crystal display, touch switches, operation and diagnostic indicating lamps, and USB local communication port; high-output battery charger; and battery packs. Upgradeable to IntelliTeam SG Automatic Restoration System	
Switch control unit. Powered by S&C Current/Voltage Sensors or customer-supplied 120-Vac source. Includes switch control with OPEN/CLOSE pushbuttons, interrupter-position indicating lamps, LOCAL/REMOTE switch, and operation counter; battery charger; battery packs; terminal strip for external inputs, sensor outputs, and remote interrupter position indication; and surge protector <sup>④</sup>	54411R1

① Switches originally supplied with option suffix “-M” manual operation option require an upgraded stored-energy operator before automation controls can be applied. Refer to your nearest S&C Sales Office.

② Battery charger is factory-calibrated to accommodate the loads in the communication and control unit at the time of shipment. If loads are subsequently added, the charging output of the battery charger should be recalibrated to optimize battery life. Refer to Table 10 on page 14 for recalibration instructions.

③ The communication and control unit—self-powered is not recommended for use with 5-watt transceivers. The limited power output of the battery charger puts the batteries in a cyclic loading condition, which may reduce battery life by up to 50%. The communication and control unit—externally powered is recommended if a 5-watt transceiver is the desired communication device.

④ The battery charger and battery packs furnished are intended to provide power for the switch only and not for customer-supplied communication and control equipment.

● Refer to your nearest S&C Sales Office.

**Table 4. Optional Features**

Item		Suffix to be Added to Switch Catalog Number
Visible-break disconnect <sup>①②</sup> . Includes three single-phase hookstick-operated blades. Interlocked to prevent opening of the disconnect when the interrupters are closed and to prevent closing of the interrupters when the disconnect is open. Includes lockout device		-D
Shielded control cable in liquid-tight flexible metal wiring conduit <sup>③</sup> 25-foot (762-cm) length 35-foot (1067-cm) length 45-foot (1372-cm) length 75-foot (2286-cm) length 100-foot (3048-cm) length		-G25 -G35 -G45 -G75 -G100
Sensors for use on 60-Hz systems <sup>③</sup>	Three-phase S&C Current Sensors on one side of switch	-I3
	Three-phase S&C Current/Voltage Sensors on one side of switch	-E3
Sensors for use on 50-Hz systems <sup>③</sup>	Three-phase S&C Current/Voltage Sensors on one side of switch	-V3
Interrupter position indicator <sup>④</sup>	Indicator on right side of switch <sup>⑤</sup>	-F1
	Indicator on both sides of switch <sup>⑤</sup>	-F2
	Reversed-color indicator <sup>⑥</sup> . Reversed-color interrupter position indicating lamps must be specified on the control unit, if applicable; see Table 9 on page 14	-F3
	Reversed-color indicator on right side of switch <sup>⑤⑥</sup> . Reversed-color interrupter position indicating lamps must be specified on the control unit, if applicable; see Table 9 on page 14	-F4
	Reversed-color indicator on both sides of switch <sup>⑤⑥</sup> . Reversed-color interrupter position indicating lamps must be specified on the control unit, if applicable; see Table 9 on page 14	-F5
	International symbol indicator	-F6
	International symbol indicator on right side of switch <sup>⑤</sup>	-F7
	International symbol indicator on both sides of switch <sup>⑤</sup>	-F8
Arrester mounting brackets <sup>⑦</sup>	Provisions for three surge arresters	-A1
Hookstick operating mechanism <sup>⑧</sup> . Replaces stored-energy operating mechanism furnished as standard	Compact-crossarm upright—extra mounting pole clearance, compact-crossarm upright compact	-M
Sensor-ready switch. Sensor mounting provisions for switches specified without sensors <sup>③⑨⑩</sup>	For Installation of customer-furnished sensors	-N1
	For separate installation of S&C Current Sensors	-N2
	For Separate Installation of S&C Current/Voltage Sensors. Includes voltage limiter	-N3
Pole band and J-bolts	All mounting configurations	-P1
Dead-ending provisions. Includes pole band, J-bolts, dead-ending angles, and set of six 16-inch (406-mm) extension links	Compact-crossarm upright—extra mounting-pole clearance, compact-crossarm tiered outboard	-P2
Wildlife Covers		-W

① Switches furnished with optional visible-break disconnect, catalog number suffix “-D,” do not have a 900-ampere continuous rating (see footnote 6 on page 10). If this rating is required, refer to your nearest S&C Sales Office.

② Not available on switches in the compact-crossarm tiered-outboard mounting configuration.

③ Not available for switches with option suffix “-M.”

④ Not available on switches in the compact-crossarm tiered-outboard mounting configuration. These switches are equipped with one indicator, on the bottom of the switch.

⑤ An interrupter position indicator (green for “open,” red for “closed”) is furnished as standard on the left side of switch as viewed from the front (compact-crossarm upright and compact-crossarm upright compact mounting configurations) or the bottom of the switch (compact-crossarm tiered-outboard mounting configurations).

⑥ Reversed-color interrupter position indicator (green for “closed,” red for “open”) is available only in instances where the end user is a Canadian utility requiring this color scheme. This optional feature is not available to any other customers.

⑦ Three arrester mounting brackets are provided as standard on one side of the switch.

⑧ Not suitable for automation or remote supervisory applications.

⑨ Includes wiring harness for sensor connection.

⑩ Not available on switches furnished with factory-installed S&C Current Sensors or S&C Current/Voltage Sensors.

Table 5. Scada-Mate SD Switching System/Services Packages

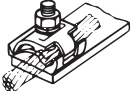
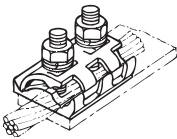
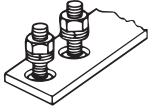
Item	
<b>14.4-kV Scada-Mate SD Switching System/Services Packages</b> Includes compact-crossarm mounting configuration Scada-Mate SD Switches catalog number 358112R1-G35E3A1, with 35-foot (1067-cm) shielded liquid-tight control cable, three-phase 60-Hz voltage sensing on jaw side of switch, and provisions for three surge arresters Each switch includes 6801 Automatic Switch control catalog number 6801-F01H9JB1K1P0S3W2XRxxXS3 and remote antenna kit catalog number 903-002132-03. Services furnished include communication site survey, IntelliTeam SG system factory acceptance testing, IntelliTeam SG system training, and IntelliTeam SG system commissioning	Three-Member Team
	Four-Member Team
	Five-Member Team
	Six-Member Team
	Seven-Member Team
	Eight-Member Team
	Nine-Member Team
	Ten-Member Team
	Eleven-Member Team
	Twelve-Member Team
<b>25-kV Scada-Mate SD Switching System/Services Packages</b> Includes compact-crossarm mounting configuration Scada-Mate SD Switches catalog number 35811R1-G35E3A1, with 35-foot (1067-cm) shielded liquid-tight control cable, three-phase 60-Hz Voltage sensing on jaw side of switch, and provisions for three surge arresters Each switch includes 6801 Automatic Switch Control catalog number 6801-F01H9JB1K1P0S3W2XRxxXS3 and remote antenna kit catalog number 903-002132-03. Services furnished include communication site survey, IntelliTeam SG system factory acceptance testing, IntelliTeam SG system training, and IntelliTeam SG system commissioning	Three-Member Team
	Four-Member Team
	Five-Member Team
	Six-Member Team
	Seven-Member Team
	Eight-Member Team
	Nine-Member Team
	Ten-Member Team
	Eleven-Member Team
	Twelve-Member Team

Table 6. Scada-Mate SD Switching System Services Packages

Item	Catalog Number
<b>Communication site survey.</b> Field testing to confirm that user-proposed Scada-Mate SD Switch locations will provide acceptable communication between team members and head-end SCADA radio, if applicable. User should make available their engineer/technician responsible for the project	AS100
<b>IntelliTeam SG system device settings determination.</b> Determination of these settings is essential to the successful implementation of IntelliTeam SG, and must be documented prior to factory acceptance testing and commissioning	AS109
<b>IntelliTeam SG system factory acceptance testing.</b> Factory testing ensures that all information required for successful IntelliTeam SG implementation is gathered and understood prior to commissioning. Provides insight on how IntelliTeam SG system will work on the user's system. User must travel to Chicago to witness the testing	AS104
<b>IntelliTeam SG system training.</b> On-site training on functioning of IntelliTeam SG system. Includes operations and engineering training sessions	AS101
<b>IntelliTeam SG system commissioning.</b> Ensures Scada-Mate SD Switches have been set up correctly and IntelliTeam SG system is ready to be put into service	AS102
<b>IntelliTeam SG system SCADA integration.</b> Includes review of user's SCADA system, development of DNP points lists, coordination with the user's SCADA supplier, and review of SCADA database	AS103
<b>IntelliTeam SG system monitoring.</b> Ongoing remote monitoring ensures IntelliTeam SG system operation meets agreed-upon service levels. Minimum monitoring period is six months	AS105
<b>Scada-Mate SD Switching System maintenance.</b> Includes inspection, testing, and battery replacement on a three-year interval	AS106
<b>Scada-Mate SD Switching System project and construction management.</b> Includes Scada-Mate SD Switch installation, construction oversight, and EPC projects	AS107



**Table 7. Connectors**

Illustration	Description	Accommodating Conductor	Catalog Number
	Bronze body, tin plated, single ½–13 × 2½-inch galvanized steel bolt	No. 2 solid (33.6 mm²) through 500 kc mil (335 mm²) stranded copper or aluminum	4740R1●
	Aluminum-alloy body, Tin Plated, Two ½–13 × 2¾-inch galvanized steel bolts	No. 2 solid (33.6 mm²) through 500 kc mil (335 mm²) stranded copper or aluminum	4741R2●
	Provision only for compression connectors. Includes two ½–13 × 2-inch galvanized steel bolts		4581●

● Connector suitable for hot-line tool handling.

**Table 8. Control Units for Automatic Source-Transfer Applications<sup>①</sup>**

Item	Catalog Number
Model 6802 Automatic Switch Control. Powered by S&C Current/Voltage Sensors. Provides sophisticated RTU functionality. Includes faceplate with liquid-crystal display, touch switches, operation and diagnostic indicating lamps, and USB local communication port; high-output battery charger; and battery packs. Upgradeable to IntelliTeam SG Automatic Restoration System	●

<sup>①</sup> Switches originally supplied with option suffix “-M” require an upgraded stored-energy operator before automation controls can be applied. Refer to your nearest S&C Sales Office.

● Refer to the nearest S&C Sales Office.

**Table 9. Optional Features—For Control Units**

Item	Applicable to Control Unit	Suffix to be Added to Catalog Number
Reversed-Color interrupter position indicating lamps <sup>①</sup> . Reversed-color interrupter position indicator must be specified on the switch; see Table 4 on page 12	All	-M2
IntelliTeam SG Automatic Restoration System	Model 6801 and 6802	●
		●
Customer-specified communication device	Model 6802	●

<sup>①</sup> Reversed-color interrupter position indicator (green for “closed,” red for “open”) is available only in instances where the end user is a Canadian utility requiring this color scheme. This optional feature is not available to any other customers.

● Refer to the nearest S&C Sales Office.

**Table 10. Accessories for Scada-Mate SD Switches and Control Units**

Item	Catalog Number
Shielded control cable connector cover. Protects connector at control-unit end of cable if control unit is disconnected. Includes sensor shorting blocks	SDA-2456
Detailed hardware manual for switch control unit. Includes schematic diagrams, circuit board layouts, parts lists, bench-check procedures, and operating descriptions for switch control and battery charger	RD-3585
Battery charger recalibration procedure. Includes detailed instructions for calibrating charging voltage to optimize battery life	RD-3808

**Table 11. Spare or Replacement Liquid-Tight Shielded Control Cables—24 Pins on Each End**

Item	Catalog Number
25 feet (762 cm)	SDA-2338-25
35 feet (1067 cm)	SDA-2338-35
45 feet (1372 cm)	SDA-2338-45
75 feet (2286 cm)	SDA-2779-75
100 feet (3048 cm)	SDA-2779-100

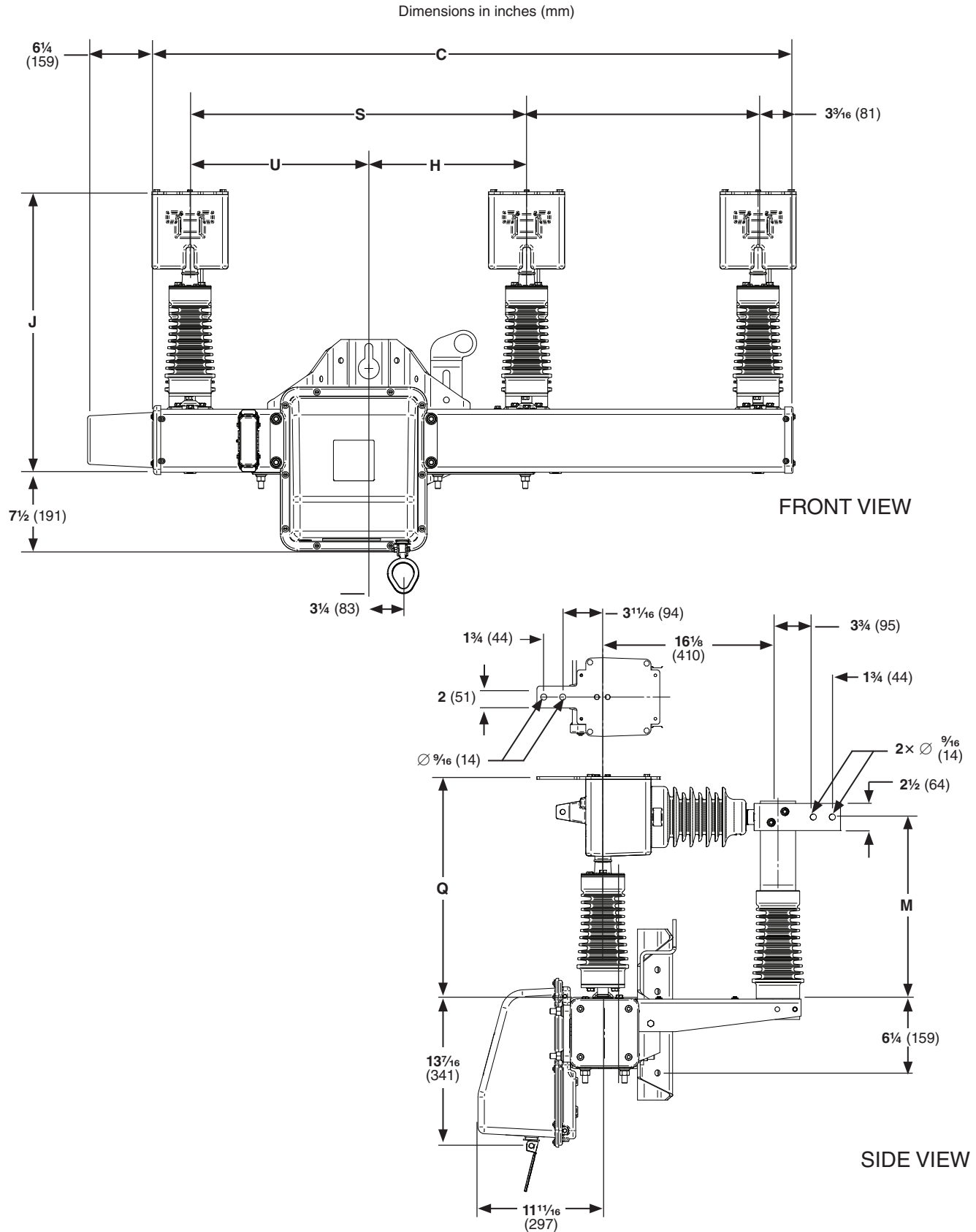
**Table 12. Static-Dissipative Work Surface**

Item	Catalog Number
3M 8501 Portable Static-Dissipative Field Service Kit. Includes a static-dissipative work mat and ground cord assembly with wrist strap, for connecting the mat—along with the person changing out the component—to the same ground point	9931-218

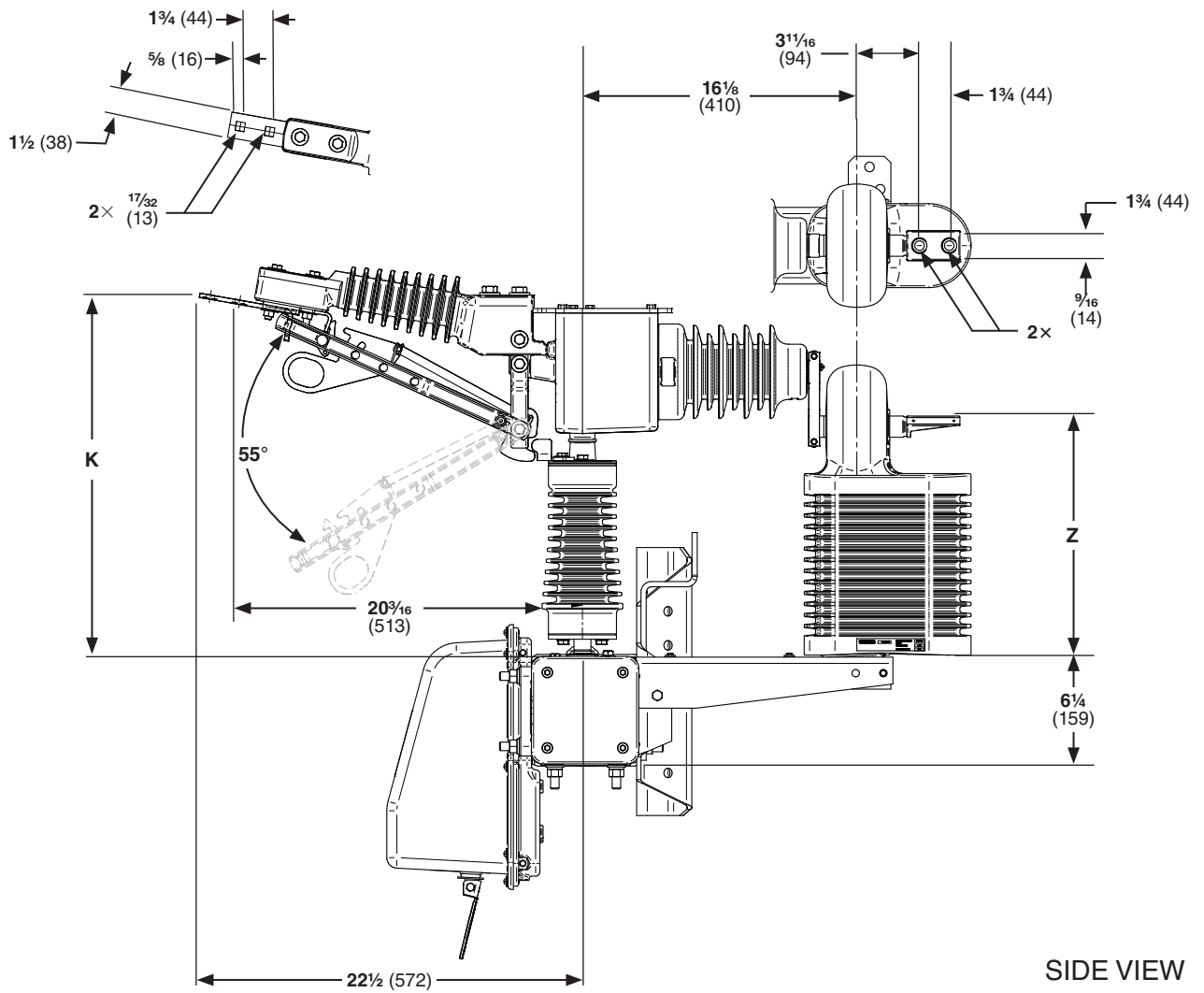
**Table 13. Scada-Mate SD Reference Drawings**

Configuration	Catalog Number	Sensor Option	Wiring Drawing	Erection Drawing	Instruction Sheet	Suffix “A1” Arrester Mtg. Brackets	Suffix “W1” Wildlife Protection
14.4-kV compact-crossarm upright	358112R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083	ED-755 ED-758 for Manual M suffix	775-510	Contact S&C	Contact S&C
14.4-kV compact-crossarm upright extra mounting-pole clearance	358212R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083				
14.4-kV compact-crossarm tiered-outboard	358412R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083	ED-757	775-512		
25-kV compact-crossarm upright	358113R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083	ED-755 ED-758 for Manual M suffix	775-510		
25-kV compact-crossarm upright extra mounting-pole clearance	358213R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083				
25-kV compact-crossarm tiered-outboard	358413R1	w/o sensors I3 E3 or V3	CDR-7085 CDR-7082 CDR-7083	ED-757	775-512		

**Compact-Crossarm Upright and Compact-Crossarm Upright—Extra Mounting-Pole Clearance Mounting Configurations**



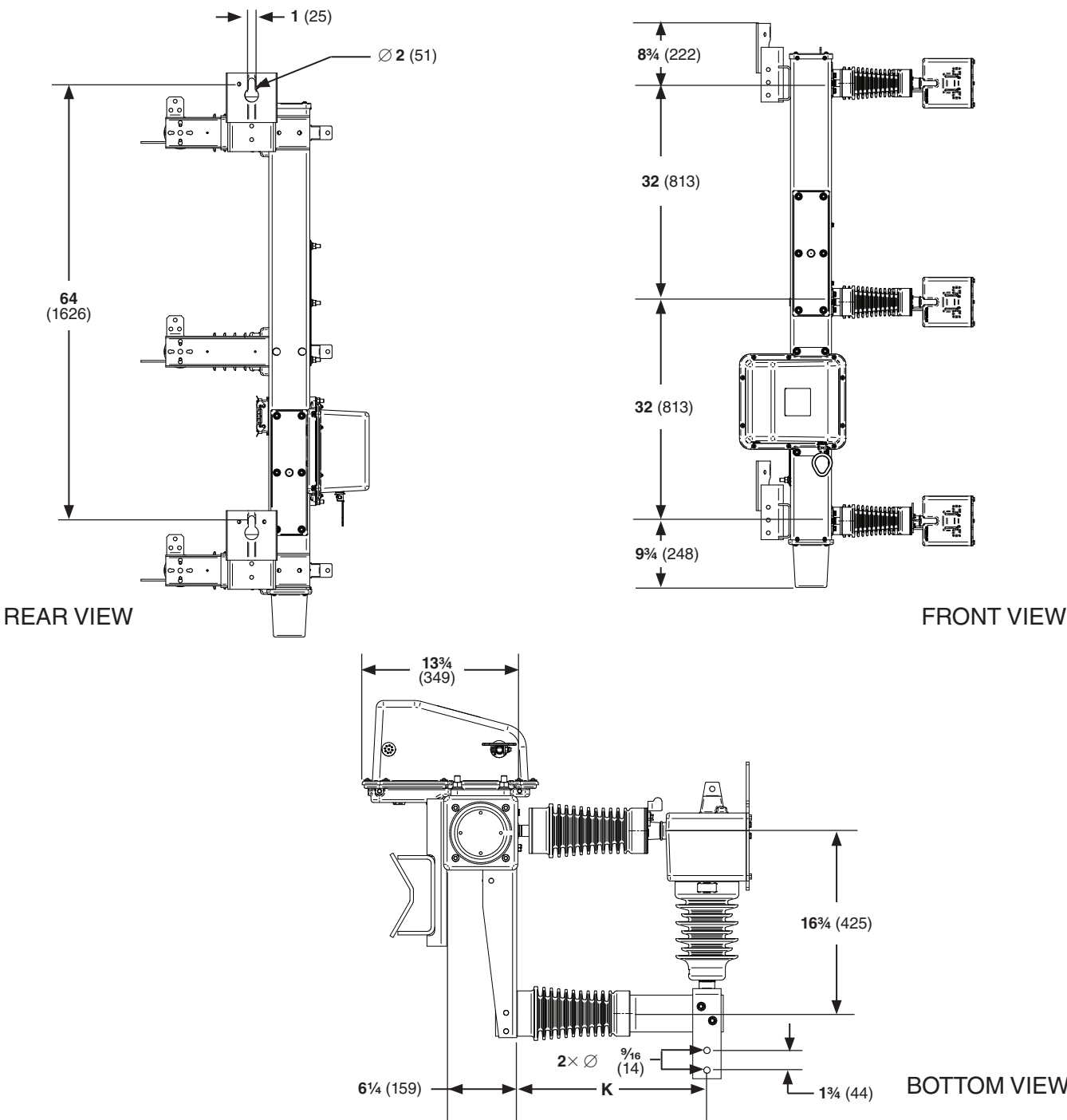
Dimensions in inches (mm)



Catalog Number	Nominal Voltage, kV	Dimensions in Inches (mm)								
		C	H	J	K	M	S	U	Q	Z
358112R1	14.4 kV	60 <sup>13</sup> / <sub>16</sub> (1545)	15 (381)	23 <sup>7</sup> / <sub>16</sub> (595)	18 <sup>1</sup> / <sub>4</sub> (464)	13 <sup>1</sup> / <sub>2</sub> (343)	32 (813)	17 (432)	17 <sup>5</sup> / <sub>16</sub> (440)	10 <sup>15</sup> / <sub>16</sub> (278)
358113R1	25 kV	60 <sup>13</sup> / <sub>16</sub> (1545)	15 (381)	26 <sup>11</sup> / <sub>16</sub> (678)	21 <sup>1</sup> / <sub>2</sub> (546)	16 <sup>3</sup> / <sub>4</sub> (425)	32 (813)	17 (432)	20 <sup>9</sup> / <sub>16</sub> (522)	14 <sup>3</sup> / <sub>16</sub> (360)
358212R1	14.4 kV	78 <sup>13</sup> / <sub>16</sub> (2002)	24 (610)	23 <sup>7</sup> / <sub>16</sub> (595)	18 <sup>1</sup> / <sub>4</sub> (464)	13 <sup>1</sup> / <sub>2</sub> (343)	48 (1219)	24 (610)	17 <sup>5</sup> / <sub>16</sub> (440)	9 <sup>5</sup> / <sub>8</sub> (244)
358213R1	25 kV	78 <sup>13</sup> / <sub>16</sub> (2002)	24 (610)	26 <sup>11</sup> / <sub>16</sub> (678)	21 <sup>1</sup> / <sub>2</sub> (546)	16 <sup>3</sup> / <sub>4</sub> (425)	48 (1219)	24 (610)	20 <sup>9</sup> / <sub>16</sub> (522)	10 <sup>15</sup> / <sub>16</sub> (278)

Compact-Crossarm Tiered-Outboard Mounting Configuration

Dimensions in inches (mm)



Catalog Number	Nominal Voltage, kV	Dimension in Inches (mm)
		K
358412R1	14.4 kV	13 7/16 (341)
358413R1	25 kV	16 11/16 (424)