



# VISTA<sup>®</sup> AND VISTA<sup>®</sup> GREEN UNDERGROUND DISTRIBUTION SWITCHGEAR

FOR UTILITIES

Improves reliability, sustainability, and safety while reducing maintenance costs

## Introduction

As the grid becomes more complex, utilities are facing a variety of challenges pressuring them to reassess their medium-voltage switchgear. In fact, some switchgear even poses risks that increase operation and maintenance (O&M) expenses while reducing reliability. As utilities reevaluate the

switchgear on their system, they importantly should consider the scope of the challenges they may face and the breadth of switchgear products available that can best meet the needs of today's grid.

### Risks and expenses of oil-insulated switchgear.

Oil-insulated switchgear is a common utility choice. However, such switchgear comes with environmental and maintenance challenges. Utilities must routinely monitor oil switchgear to maintain performance, especially during colder months. Additionally, lack of routine maintenance can lead to equipment failure, causing an outage to all customers served by the affected line. Leaks from oil-insulated switchgear have also had negative environmental impacts, resulting in costly clean-up efforts. Some oil-insulated switchgear also requires mandatory testing, meaning more time, effort, and money are wasted to routinely inspect the gear.

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**Regulatory pressures.** Utilities are also facing greater pressure to limit the use of sulfur hexafluoride (SF<sub>6</sub>) gas and reduce the carbon footprint of their switchgear, with an increased focus on meeting corporate sustainability goals and adhering to forthcoming federal greenhouse gas regulations. As a result, utilities are reconsidering SF<sub>6</sub> gas-insulated switchgear because of concerns operations may result in greenhouse gas emissions. Solid-dielectric switchgear can replace SF<sub>6</sub> gas-insulated switchgear, but solid-dielectric technology has limitations, such as lower ratings and lack of three-position switching. In addition, solid-dielectric switchgear has a higher carbon footprint because of the type and mass of materials used in their construction and limited recyclability versus alternatives such as air- or gas-insulated switchgear.

**Space constraints.** Additionally, utilities that serve sprawling urban areas may face challenges with the physical footprint of their gear. Compact medium-voltage switchgear that can fit in a tight underground vault is often required to alleviate the safety concerns public-facing equipment presents. If the switchgear does not have clearly visible breaks, utility crews can find it challenging to confirm the switchgear's operation status while working in a vault. Moreover, if the switchgear does not have front-facing cable terminations and operators, crews may have difficulty installing and navigating around the switchgear in a vault to effectively deenergize the device.

**Fortunately, Vista and Vista Green Underground Distribution Switchgear provide a suite of solutions to address the specific challenges each utility faces.** S&C designed these solutions to provide reliable protection, regardless of location or environmental conditions, including in areas that experience flooding. Both switchgear offerings are also available in multiple above- or below-grade installation styles and an eco-friendly insulation technology option is available. With their single-handle operation, visible gaps, and flexible cable orientations, Vista or Vista Green switchgear are simple to routinely operate. Vista and Vista Green switchgear can tackle whatever challenges a utility might face.

## Application

Vista and Vista Green Underground Distribution Switchgear are designed to simplify operating tasks and enhance safety while minimizing the traditional switchgear footprint. Vista and Vista Green switchgear introduce a new level of safety and simplicity by eliminating the need for cable-handling during routine operation. Just one person is needed to operate Vista and Vista Green switchgear, and there's no necessary exposure to medium voltage.

Vista and Vista Green switchgear are available in manual, remote-supervisory, and source-transfer models in ratings through 38 kV and 25 kA symmetrical short-circuit. All models are elbow-connected and enclosed in a submersible, welded stainless steel tank.

Vista and Vista Green switchgear can accommodate any combination of up to six bus taps, load-

interrupter switches, or fault interrupters. Each model features load-interrupter switches and resettable vacuum fault interrupters or arc spinners in series with disconnect switches. The load-interrupter switches provide three-pole live switching of 600-ampere or 900-ampere three-phase circuits.

Vista Green switchgear features all the benefits of Vista switchgear, but instead uses an eco-friendly insulating gas composed of CO<sub>2</sub> mixed with a C4-FN additive.

Vista and Vista Green switchgear are available in six installation styles:

**Pad-Mounted Style.** This style improves aesthetics and reduces real-estate requirements—especially at 34.5 kV, where air-insulated gear is too large to be practical in many applications.



**FIGURE 1.** Two pad-mount Vista switchgear units.

**UnderCover™ Style.** Out of sight, yet easy to operate from ground level, submersible UnderCover Style Vista and Vista Green switchgear are ideal where aesthetics are important or where space limitations make it difficult to deploy gear above ground.

**Vault-Mounted Style.** This style provides a compact switching-and-protection solution for subsurface applications, electrical rooms, and sidewalk vaults, where space is very limited. A single unit accommodates up to six load-interrupter switches, fault interrupters, or a combination of each.

**Single-Way Wind-Turbine Style.** This slim, single-way three-phase version fits through a 24-inch (610-mm) wide opening. It provides connection and switching points for the medium-voltage cables from the generator output. Because of its side-operation, it can be positioned along a wall.

**Mobile Heavy-Duty Style.** This unique version of Vista and Vista Green switchgear is suitable for temporary or permanent installations. Developed for the U.S. military, this small, lightweight Vista and Vista Green switchgear style is specially designed to withstand the rigors of extended air transport at high altitude.

**Special Applications.** Vista and Vista Green switchgear can be engineered to suit a variety of “special” applications. For example, if a utility expands a conventional metal-enclosed switchgear lineup to accommodate two additional feeders—but there is only room for one more bay—a new bay externally matching the others can be constructed that contains a Vista switchgear unit.

## Construction

- A** **Optional VOLTAGE indicator with liquid-crystal display**—Includes a self-test feature
- B** **Compact stainless steel tank**—Protects switching and protection components from the environment
- C** **Pressure gauge**—Located under the window in the tank, temperature- and altitude-compensated
- D** **Operating mechanisms**—For switches and fault interrupters, padlockable in any position
- E** **Operation selector**—Prevents operations from the Closed position directly to Grounded position and vice versa
- F** **Motor operators**—The operators facilitate remote power operation of load-interrupter switches and fault interrupters. The operators can be decoupled to permit testing of the motor and controls. Factory-installation is optionally available.
- G** **Microprocessor-based overcurrent control**—Housed in a watertight enclosure (Current transformers provide power and signal inputs.)
- H** **Blade-viewing window**—Located under this cover, allows visual confirmation of the blade position



FIGURE 2. Vista and Vista Green Underground Distribution Switchgear

## Features

**Simple, one-hand operation.** Access and operate the switchgear without cable-handling or high-voltage exposure for a higher level of safety.

**No external grounds.** Ground medium-voltage cables using a standard internal ground switch. External grounds are not required.

**Dust-, corrosion-, and leak-proof stainless steel tank.** The gas-tight tank (SF<sub>6</sub>) or hermetically sealed tank (CO<sub>2</sub> mix) prevents leaking, rusting, or switchgear contamination.

**Submersible.** Switchgear is built to operate without being affected by water hazards, such as storm-surge flooding or tides.

**High degree of protection against the environment.** The gas-tight tank (SF<sub>6</sub>) or hermetically sealed tank (CO<sub>2</sub> mix) protects elements from exposure to moisture or wildlife.

**Large viewing windows and visible open gap.** This provides a clear indication of the switch position and a clear view of the isolating disconnects, allowing operating personnel to easily confirm the positions of load-interrupter switches and fault interrupters.

**Improved worker safety.** No fuse handling is required, minimizing access and exposure to medium-voltage components.

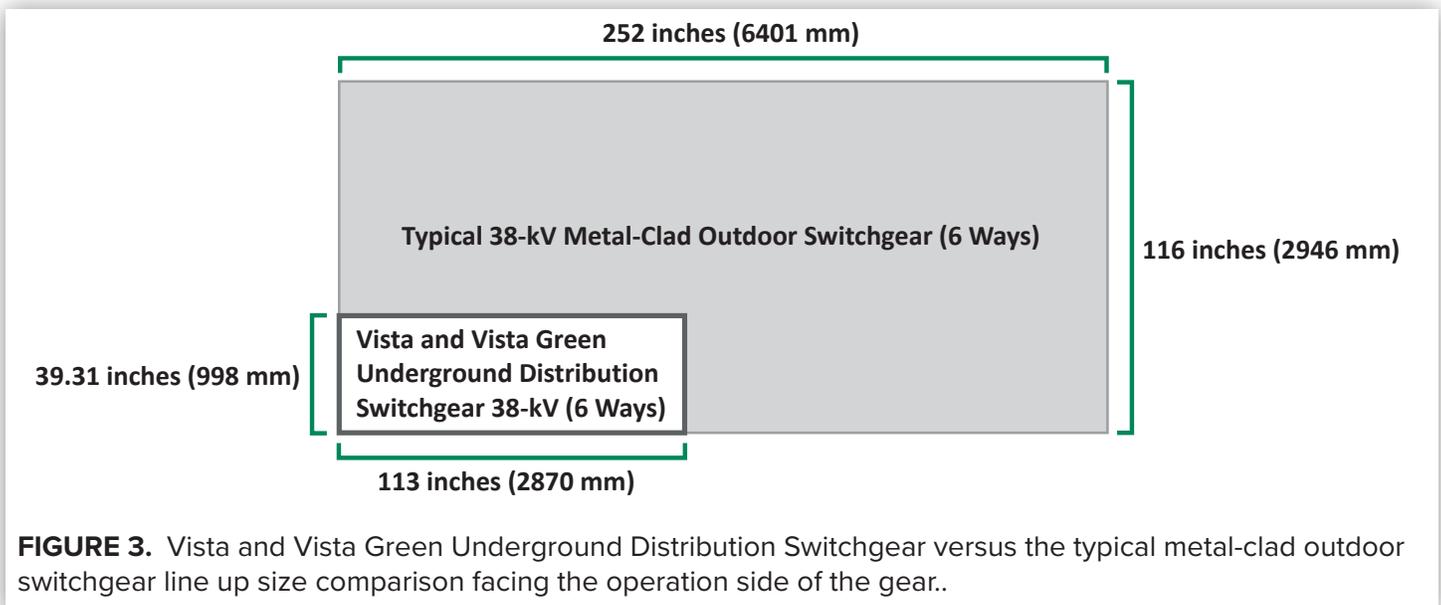
**Overcurrent control.** Superior coordination, flexibility, and reliability are made possible with

a self-powered and user-friendly control. The overcurrent control detects faults and initiates operation of the resettable fault interrupters. This proven device offers special, customizable “coordinating” speed TCC curves that provide complete coordination with upstream relays and downstream fuses. Separate phase- and ground-overcurrent curves coordinate with the ground-trip settings of source-side circuit breakers. Both main and tap curves are included for complete coordination between fault interrupters applied on main feeders and those applied on subloop taps.

The overcurrent control is programmed with a personal computer, in the shop or in the field. The overcurrent control records up to a total of 64 of the most recent trip events.

**Aesthetic improvement.** The switchgear comes in a compact, low-profile design. At 15, 25, and even 34.5 kV, pad-mounted Vista and Vista Green switchgear are 6 to 14 inches (152 to 356 mm) shorter than, and the total real-estate requirement is less than one-third of, the average gas-insulated gear and less than half the real estate of metal-clad switchgear. See Figure 3.

Another innovative installation offering is the UnderCover Style, which is ideal for areas with stringent real-estate restrictions or where aesthetics are important. The Vista and Vista Green switchgear are installed underground, but all operations are easily performed by one operator above ground.



## Options

**Manual.** Manual Vista and Vista Green Underground Distribution Switchgear are engineered to simplify operation, and provide an intuitive solution to managing complex medium-voltage power-delivery needs. All manual Vista and Vista Green switchgear units are operated using a specially designed operating handle. It has been designed to prevent switch operators from going directly to the Ground position from the Closed position and vice versa.

**Remote supervisory.** Available in ratings through 38 kV, remote supervisory Vista and Vista Green Underground Distribution Switchgear provide automated switching and fault protection and—when applied in the High-Speed Fault-Clearing System—can also perform auto-sectionalizing without tripping the main breaker. It incorporates the same outstanding features as manual Vista and Vista Green switchgear and can be specified with a communication and control equipment group for a completely integrated, self-powered switching and protection package. Users may choose a terminal unit, including a 6800 Series Automatic Switch Control. These sophisticated controls support S&C's self-healing, scalable IntelliTeam® SG Automatic Restoration System— a universal smart grid solution offering unmatched interoperability. Users also have a choice of communication devices.

**Source-transfer.** Available in ratings through 38 kV, source-transfer Vista and Vista Green Underground Distribution Switchgear provide fully automatic primary-selective service and fault protection for one, two, or three critical load circuits. It's available in common-bus and split-bus configurations. This smart grid solution incorporates the same outstanding features as manual Vista and Vista Green switchgear, plus the Micro-AT® Source-Transfer Control, motor operators, three-phase voltage sensing on source ways, and voltage transformers for control power.

The Micro-AT Source-Transfer Control offers self-healing response to distribution system problems. It transfers on loss of source, voltage unbalance, or any source-side open-phase condition. An optional Overcurrent Lockout feature prevents an automatic transfer operation that would close a source load-interrupter switch into a fault. An optional

communications card lets users rapidly upload event log information to their desktop computer.

**Portable motor operator.** Local motor operation of Vista and Vista Green switchgear is also available for users who do not require a complete automation package. The operator easily attaches to any load-interrupter switch or single-pole or three-pole fault interrupter. The hand-held control features OPEN, CLOSE, and GROUND pushbuttons, an ENABLE button to prevent inadvertent operation, and a READY indicating light.

**External trip.** External trip provisions are optionally available, permitting the fault interrupters to be tripped remotely by external controls or relays.

**Remote Low-Pressure Alarm.** In addition to the gas pressure indication on the gear, users can specify a remote low-pressure alarm. This notifies a SCADA or monitoring system. S&C can also develop a monitoring solution via its Global Support and Monitoring Center.

**Auxiliary contacts.** Auxiliary contacts provide an indication of switch and interrupter status. They can be ordered and used immediately in a monitoring or remote-supervisory application or to provide future opportunities to do so.

**15.5-kV loadbreak switches rated 40 kA symmetrical short time.** Vista switchgear models with 15-kV loadbreak switches rated 40 kA symmetrical short time are an ideal fit for sectionalizing underground distribution networks. Switchgear in urban areas is frequently installed subsurface or in street or sidewalk vaults, so a compact size is generally required along with an ability to withstand routine flooding. Available fault-current levels also may be very high and exceed the capabilities of most compact and submersible switchgear. Unlike lower-rated switchgear, it eliminates the need to incorporate current-limiting devices, which are difficult to coordinate and increase operating complexity.

**SEL metering and relays.** When monitoring, protection, and communication are needed beyond our standard offering, Vista switchgear can be ordered with your choice of SEL devices, including:

- SEL-751
- SEL-451
- SEL-2440
- SEL-3505 RTAC
- Others

Contact your local S&C Application Director or salesperson for more information.



**FIGURE 4.** Two SEL-751 Feeder Protection Relays.

## Ratings

System Class, kV	Max, kV	BIL, kV	Main Bus Continuous Current, Amperes, Root Mean Square	Short-Circuit, Symmetrical, Amperes, Root Mean Square	Fault Interrupter, Continuous, Load Dropping and Load Splitting, Amperes, Root Mean Square <sup>1</sup>	Fault Interrupter, 10-Time Duty-Cycle Fault-Closing, Symmetrical, Into Closed Position, Amperes, Root Mean Square	Fault Interrupter, 10-Time Duty-Cycle Fault-Closing, Symmetrical, Into Grounded Position, Amperes, Root Mean Square	Fault Interrupter, 10-Time Duty-Cycle Fault-Interrupter, Symmetrical, Amperes, Root Mean Square
15.5 [12]	15.5 [15.5]	95 [95]	600 [630]	12500 [12500]	200 [200] <sup>2</sup>	12500 [12500]	12500 [12500]	12500 [12500]
15.5 [12]	15.5 [15.5]	95 [95]	600 [630] <sup>3</sup>	25000 [25000]	600 [630] <sup>4</sup>	25000 [25000]	5	25000 [25000]
27 [24]	29 [29]	125 [125]	600 [630] <sup>3</sup>	12500 [12500]	200 [200] <sup>2</sup>	12500 [12500]	12500 [12500]	12500 [12500]
27 [24]	29 [29]	125 [125]	600 [630] <sup>3</sup>	25000 [25000]	600 [630] <sup>4</sup>	25000 [25000]	5	25000 [25000]
38 [36]	38 [38]	150 [150]	600 [630] <sup>3</sup>	12500 [12500]	200 [200] <sup>2</sup>	12500 [12500]	12500 [12500]	12500 [12500]
38 [36]	38 [38]	150 [150]	600 [630] <sup>3</sup>	25000 [25000]	600 [630] <sup>4</sup>	25000 [25000]	5	25000 [25000]

**TABLE 1. 50/60-Hz ANSI Ratings for Fault Interrupter**—Fault interrupters and load interrupters may be combined in the same Vista switchgear tank [IEC ratings in brackets<sup>6</sup>]

- 1 Parallel or loop switching. Fault interrupters and load-interrupter switches can switch the magnetizing current of transformers associated with the load-dropping rating. Unloaded cable switching rating: 10 amperes at 15.5 kV; 20 amperes at 29 kV and 38 kV.
- 2 600 [630] amperes when switchgear is furnished with optional 600-ampere bushings at fault interrupter terminals, catalog number suffix “-M2” or “-M3.” **Note:** 600-ampere bushings are supplied as standard for Vista Green switchgear.
- 3 1200 [1200] amperes when switchgear is furnished with optional copper bus, catalog number suffix “-Z5.”
- 4 900 [900] amperes when switchgear is furnished with optional 900-ampere fault interrupters, catalog number suffix “-Q1” through “-Q6,” plus an optional copper bus, catalog number suffix “-Z5.” **Note:** SF<sub>6</sub> and 15.5 kV, 25 kA Vista Green switchgear models only.
- 5 25000 [25000] amperes symmetrical three-time duty-cycle fault-closing rating; 16000 [16000] amperes symmetrical 10-time duty-cycle fault-closing rating.
- 6 Refer to the nearest S&C Sales Office for other possible ratings.

System Class, kV	Max, kV	BIL, kV	Main Bus Continuous Current, Amperes, Root Mean Square	Short-Circuit, Symmetrical, Amperes, Root Mean Square	Load-Interrupter Switch, Continuous, Load Dropping and Load Splitting, Amperes, Root Mean Square <sup>1</sup>	Load-Interrupter Switch, 10-Time Duty-Cycle Fault-Closing, Symmetrical, Amperes, Root Mean Square <sup>2</sup>	Load-Interrupter Switch, Momentary and One-Second, Symmetrical, Amperes, Root Mean Square
15.5 [12]	15.5 [15.5]	95 [95]	600 [630]	12500 [12500]	600 [630] <sup>3</sup>	12500 [12500]	12500 [12500]
15.5 [12]	15.5 [15.5]	95 [95]	600 [630] <sup>4</sup>	25000 [25000]	600 [630] <sup>5</sup>	<sup>6</sup>	25000 [25000]
27 [24]	29 [29]	125 [125]	600 [630] <sup>4</sup>	12500 [12500]	600 [630] <sup>3</sup>	16000 [16000]	12500 [12500]
27 [24]	29 [29]	125 [125]	600 [630] <sup>4</sup>	25000 [25000]	600 [630] <sup>5</sup>	<sup>6</sup>	25000 [25000]
38 [36]	38 [38]	150 [150]	600 [630] <sup>4</sup>	12500 [12500]	600 [630] <sup>3</sup>	16000 [16000]	12500 [12500]
38 [36]	38 [38]	150 [150]	600 [630] <sup>4</sup>	25000 [25000]	600 [630] <sup>5</sup>	<sup>6</sup>	25000 [25000]

**TABLE 2. 50/60-Hz ANSI Ratings for Load-Interrupter Switches**—Fault Interrupters and load-interrupters may be combined in the same Vista switchgear tank [IEC ratings in brackets<sup>7</sup>]

- 1 Parallel or loop switching. Fault interrupters and load-interrupter switches can switch the magnetizing current of transformers associated with the load-dropping rating. Unloaded cable switching rating: 10 amperes at 15.5 kV; 20 amperes at 29 kV and 38 kV.
- 2 Applicable to fault closing into closed or grounded position.
- 3 200 [200] amperes when switchgear is furnished with optional 200-ampere bushing wells at load-interrupter switch terminals, catalog number suffix “-M4.” **Note:** SF<sub>6</sub> switchgear models only.
- 4 1200 [1200] amperes when switchgear is furnished with optional copper bus, catalog number suffix “-Z5.”
- 5 900 [900] amperes when switchgear is furnished with optional 900-ampere load-interrupter switches, catalog number suffix “-K1” through “-K6,” plus an optional copper bus, catalog number suffix “-Z5.” **Note:** SF<sub>6</sub> and 15.5 kV, 25 kA Vista Green switchgear models only.
- 6 25000 [25000] amperes symmetrical three-time duty-cycle fault-closing rating; 16000 [16000] amperes symmetrical 10-time duty-cycle fault-closing rating.
- 7 Refer to the nearest S&C Sales Office for other possible ratings.



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