Vista® and Vista® SD
Underground Distribution Switchgear for Utilities

Improves reliability and safety while reducing maintenance costs
Introduction

Live-front switchgear has been an industry standard for decades, but it is not impervious to wildlife and weather. Wildlife has been known to work its way into switchgear cabinets, causing damage. High humidity, salt spray, and agricultural and industrial pollution can all affect gear and ultimately contribute to a misoperation.

With an increase in significant weather events, including flooding, utilities are looking at hardening power systems against the environment to improve customer reliability, all while keeping safety a top priority.

Indeed, live-front switchgear can expose line crews operating the gear to high voltage. As such, line crews must carefully consider approach distances and use proper protective equipment before working on live-front gear, such as when handling and replacing fuses. These operations may require significant crew training and procedures to help prevent crew exposure to high voltage wherever possible.

Additionally, live-front switchgear requires routine maintenance, which includes cleaning cable terminations and insulators to ensure proper operation over the life of the gear. Dirty, damaged, or flooded live-front gear can become an urgent utility priority and an operation and maintenance (O&M) expense to avoid flashovers.

Utilities have dealt with these pains for decades based on the assumption this was just the cost of doing business. But alternative switchgear options exist today.

Some utilities have opted to change their live-front gear for oil switchgear. This change presents a new set of challenges. Oil switchgear must be routinely monitored for oil levels, especially during colder months. Low oil levels have led to equipment failure, causing an outage to all customers serviced by that line. Leaks from oil switchgear have had negative environmental impacts and have resulted in costly clean-up efforts, leading to poor customer perception of the utility. Subsequently, some oil switchgear requires mandatory two-year testing to confirm no leaks are present on the line. Each time oil is added to a unit, the crew must consider approach distances and proper protective equipment to service the switchgear. The testing forces the utility to take an outage on the line, affecting its reliability.

Gas-insulated and solid-dielectric switchgear are alternatives to live-front and oil switchgear. Gas and solid-dielectric switchgear solutions can withstand wildlife and weather challenges, significantly reduce worker exposure, and are virtually maintenance-free.

Vista® Underground Distribution Switchgear and Vista SD Underground Distribution Switchgear are the best alternatives to live-front switchgear. Using sulfur hexafluoride (SF₆) or solid-dielectric technology, Vista switchgear is designed to provide reliable protection, even in the face of major weather events. The switchgear’s simple, single-handle operation and visible gaps allow performance of routine operations without confusion and with less worker exposure to medium voltage. Vista switchgear’s sealed tank design protects the equipment from contaminants, wildlife, and weather elements, allowing it to require virtually no maintenance. As a result, utilities are able to reduce O&M costs compared to live-front gear.

The chart shown in Figure 1 compares live-front switchgear to Vista switchgear over 20 years. The first item to look at is purchase price. Live-front gear’s purchase price is significantly less than Vista switchgear. But live-front gear will require routine maintenance and cleaning to ensure effective operation, adding to a utility’s O&M costs. As fuses operate, the utility will need to dispatch a crew to replace them and bring the switchgear back into operation. If live-front gear is not properly maintained, damage could be significant and require a full unit replacement.

Considering the purchase and maintenance costs associated with live-front gear over 20 years, Vista switchgear’s purchase price is only 10% more than live-front gear and is mechanically maintenance-free.

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Vista Underground Distribution Switchgear

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

Vista switchgear is 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 steel tank. Vista 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 switchgear is 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.

- **UnderCover™ Style.** Out of sight, yet easy to operate from ground level, submersible UnderCover Style Vista switchgear is 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 manholes, 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.

- **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 alongside a wall.

- **Manhole Style.** This round, single-way, three-phase version is installed through the opening of an underground vault

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

Vista Switchgear for Special Applications. Vista 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 was only room for one more bay—a new bay externally matching the others can be constructed that contains a Vista switchgear unit.

Vista SD Underground Distribution Switchgear

S&C Vista SD Underground Distribution Switchgear features load-interrupter switches for switching 600-ampere main feeders and microprocessor-controlled fault interrupters for the switching and protection of 600-ampere main feeders and 200- or 600-ampere taps, laterals, and subloops. These elbow-connected components are encapsulated in an environmentally friendly solid-dielectric insulating material. Vista SD switchgear is available in ratings through 29 kV and 16 kA symmetrical interrupting.

Because Vista SD switchgear is considerably smaller than traditional live-front gear, it can be installed exactly where it’s needed. It’s completely submersible and thus suitable for installation in subsurface vaults subject to flooding. Single-way Vista SD switchgear assemblies are ideally suited for application on the primary side of network transformers. Multi-way assemblies, from three to six load-interrupter switches or fault interrupters, are also available.

S&C Visi-Gap® Load-Interrupter Switches use a vacuum interrupter in series with a manually operated two-position isolating disconnect for three-pole live switching of 600-ampere three-phase circuits.

S&C Visi-Gap® Fault Interrupters use a vacuum interrupter in series with a manually operated two-position isolating disconnect for three-pole load switching of 200- or 600-ampere circuits and fault interrupting through 16 kA symmetrical at 17.5 kV and through 12.5 kA symmetrical at 29 kV.

Vista SD switchgear is offered in four installation styles:

- **Pad-Mounted Style.** Furnished with an optionally available pad-mounted style enclosure for above-grade installations; available in mild steel or stainless steel

- **Multi-Way Vault-Mounted Style.** Usable in submersible vaults with multiple source ways and/or multiple protected ways (taps)

- **Single-Way Vault-Mounted Style.** Ideally suited for use on the primary side of network transformers

- **PMH and PME Styles.** Matches the footprint and phase configuration of PMH and PME Pad-Mounted Gear
Vista Underground Distribution Switchgear

**A** Optional VOLTAGE Indicator with Liquid-Crystal Display—Includes a self-test feature

**B** Compact Welded-Steel Tank—Protects switching and protection components from the environment (Stainless steel construction is standard in UnderCover Style.)

**C** Pressure Gauge—Located under window, 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** Microprocessor-Based Overcurrent Control—Housed in a watertight enclosure (Current transformers provide power and signal inputs.)

**G** Blade-Viewing Window—Located under this cover, allows visual confirmation of the blade position
Vista SD Underground Distribution Switchgear

**Visi-Gap Load-Interrupter Switches**—Vacuum load-interrupter switches that provide three-pole live switching of 600-ampere main feeders

**Visi-Gap Fault Interrupters**—Microprocessor-controlled vacuum fault interrupters that provide three-pole live switching and protection of 600-ampere main feeders and 200- or 600-ampere taps, laterals, and sub-loops

**Mimic Bus and Indicators**—Convey the position of each switch and fault interrupter and its isolating disconnect—and whether a fault interrupter has tripped in response to a fault

**Easy-to-Operate Manual Operating Mechanism**—Allows for “trip-free” operation of fault interrupters (The opening spring is charged when the closing spring is charged and will open the fault interrupter—based on the time-current characteristic (TCC) curve in the overcurrent control—if the fault interrupter is closed into a fault.)

**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.
Simple, One-Handed 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. Prevent leaking, rusting, or contamination to switchgear with a sealed tank design.

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 sealed tank design 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 source-side circuit breakers having ground-trip settings. 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 switchgear is 6 to 14 inches (152 to 356 mm) shorter than, and its total real-estate requirement is less than one-third of, the average SF6-insulated gear and less than half the real estate of metal-clad switchgear. See Figure 2.

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 switchgear is installed underground, but all operations are easily performed by one operator aboveground.


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**Vista Underground Distribution Switchgear**

**Manual.** Manual Vista Underground Distribution Switchgear is engineered to simplify operations, and it provides an intuitive solution to managing complex medium-voltage power-delivery needs. All manual Vista 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 Underground Distribution Switchgear provides 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 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 device, including a SpeedNet™ Radio.

**Source-Transfer.** Available in ratings through 38 kV, Source-Transfer Vista Underground Distribution Switchgear provides 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 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 to their desktop computer.

**Portable Motor Operator.** Local motor operation of Vista 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 will allow a SCADA or monitoring system to engage. 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 Underground Distribution 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.

**Vista SD Underground Distribution Switchgear**

**Motor Operators.** Factory-installed motor operators are optionally available to facilitate remote power operation of load-interrupter switches and fault interrupters. They can be decoupled from the operating mechanisms to permit testing without changing the positions of the switches or fault interrupters. The motor operators require a user-furnished 100–240 Vac 50/60-Hz control power source.

**Cable Center-Line Adapters.** Adapters facilitate replacement of traditional air insulated pad-mounted gear without having to change cable terminations.
### Vista Underground Distribution Switchgear

#### Table 1. 50/60-Hz ANSI Ratings—IEC Ratings in Parentheses

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<td>15.5 (12)</td>
<td>15.5 (15.5)</td>
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<td>600 (630)</td>
<td>12 500 (12 500)</td>
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<td>600 (630)</td>
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1. Refer to the nearest S&C Sales Office for other possible ratings.
2. 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.
3. Applicable to fault closing into closed or grounded position.
4. 1200 (1200) amperes when switchgear is furnished with optional copper bus.
5. 600 (630) amperes when switchgear is furnished with optional 600-ampere bushings at fault interrupter terminals.
6. 900 (900) amperes when switchgear is furnished with optional 900-ampere fault interrupters plus an optional copper bus.

#### Table 2. Pad Mount and Vault Configurations 50/60-Hz IEEE Ratings—(IEC ratings in parentheses)

<table>
<thead>
<tr>
<th>System Class</th>
<th>Max</th>
<th>BIL</th>
<th>Voltage, kV</th>
<th>Amperes, RMS</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Main Bus Cont. Current</td>
<td>Visi-Gap® Load-Interrupter Switch</td>
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<tr>
<td>15 (12)</td>
<td>17.5 (12)</td>
<td>95 (75)</td>
<td>600 (630)</td>
<td>16 000 (200)</td>
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<td>27 (24)</td>
<td>29 (24)</td>
<td>125 (125)</td>
<td>600 (630)</td>
<td>12 500 (12 500)</td>
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1. Parallel or loop switching. Load-interrupter switches and fault interrupters can switch the magnetizing current of transformers associated with this rating. Unloaded cable-switching capability: 10 amperes at 17.5 kV; 20 amperes at 29 kV. Load-interrupter switches and fault interrupters can also switch single capacitor banks through 1800 kvar.
2. Applicable to fault closing into Closed position.
3. 200 amperes if fault interrupters are furnished with optional 200-ampere bushings.
4. 12,500 amperes if fault interrupters are furnished with optional 200-ampere bushings.