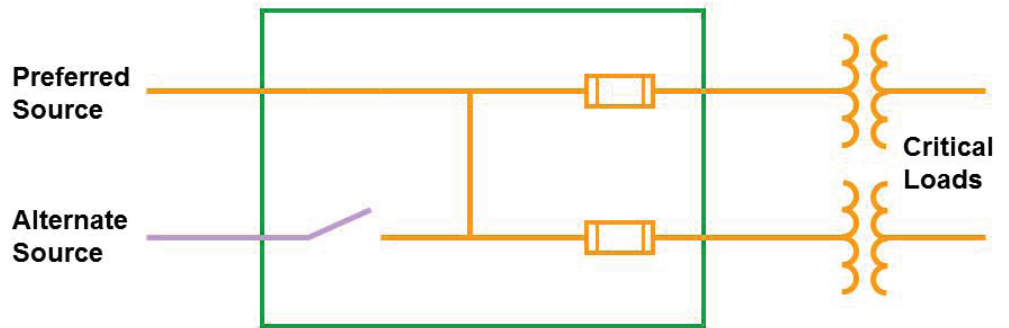


# S&C's Automatic Source-Transfer Solutions

for Overhead and Underground Distribution Systems



# S&C's Automatic Source-Transfer Solutions for Overhead and Underground Distribution Systems

The most complete range of medium- and high-voltage offerings in the industry.

Hospitals, pumping stations, shopping malls, auditoriums, and many other commercial, institutional, and industrial power users require a high degree of service continuity for their critical loads. System reliability studies have shown that the power sources serving these facilities constitute the major cause of service interruptions, as a result of their extensive exposure to lightning, wind, and ice, as well as dig-ins and equipment failure.

Before considering more broadly based—and costly—solutions for improving grid reliability, power users having critical loads frequently implement primary-selective service for their facilities to ensure the continuity of power.

Primary-selective service can be provided economically using two radial utility source feeders. This simple, direct means for powering the loads facilitates quick location and isolation of a faulted feeder. One of the utility source feeders—designated the “preferred source”—normally serves the loads. If this source is lost, the other source feeder—designated the “alternate” source—is utilized to serve the loads. A power-operated interrupter switch is furnished for each source, along with a source-transfer control, to effect automatic two-way transfer.

## The Right Solution for Your Application

S&C can furnish a variety of proven switching and protective technologies for implementing primary-selective service.

For overhead distribution systems through 69 kV, S&C offers power-operated Alduti-Rupter® Switches, Scada-Mate® Switches, and Scada-Mate CX™ Switches, in combination with a Micro-AT® Source-Transfer Control or 6800 Series Automatic Switch Control. IntelliRupter® PulseClosers can be utilized too. These solutions are discussed on pages 5 through 7 of this publication.

For underground distribution systems through 38 kV, S&C offers Source-Transfer Pad-Mounted Gear, Source-Transfer Vista® Underground Distribution Switchgear, System VI™ Switchgear, PMX™ Modular Metal-Enclosed Switchgear, and Custom Metal-Enclosed Switchgear. Pad-Mounted Style IntelliRupter® PulseClosers can be used as well. These solutions are discussed on pages 8 through 11.

## Factors to Consider

Each of these solutions offers unique features and benefits. To select the one that's right for your application, a number of factors must be considered:

- Whether the facility is served by an overhead or an underground distribution system.
- Distribution system voltage.
- Continuous and interrupting current requirements of the loads.
- Maximum-permissible source transfer time.
- The number of critical load feeders, anticipating future growth.

Other factors may need to be considered, such as:

- The requirement for SCADA integration or integration into an automatic restoration system . . . now or in the future.
- The acceptability of radio communication between remotely located controls.
- The acceptability of batteries for the controls and radios.
- The need for a split-bus arrangement. Such an arrangement permits each utility source to normally carry a portion of the facility load.
- Available space and aesthetic concerns. Overhead distribution system solutions—though generally less costly—require considerable space and might compromise aesthetics.

But what if the critical loads can't tolerate any voltage sags or swells, momentary interruptions, or frequency excursions? The conventional automatic source-transfer solutions discussed in this publication aren't suitable. Fortunately, there are technologies available for these applications . . .

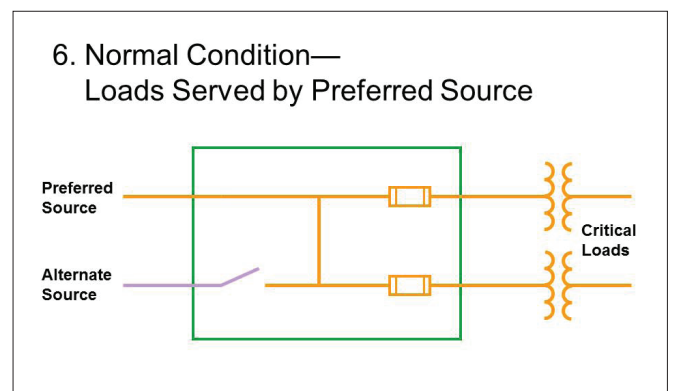
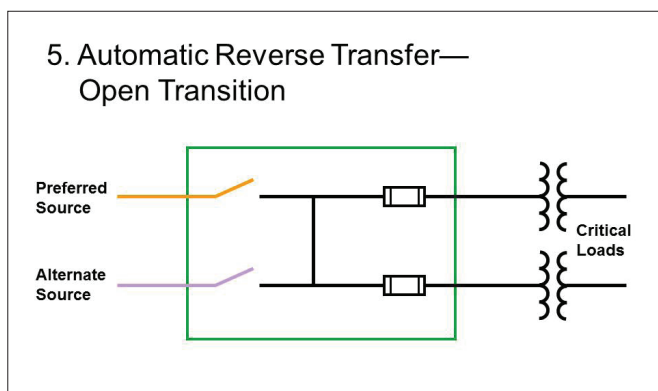
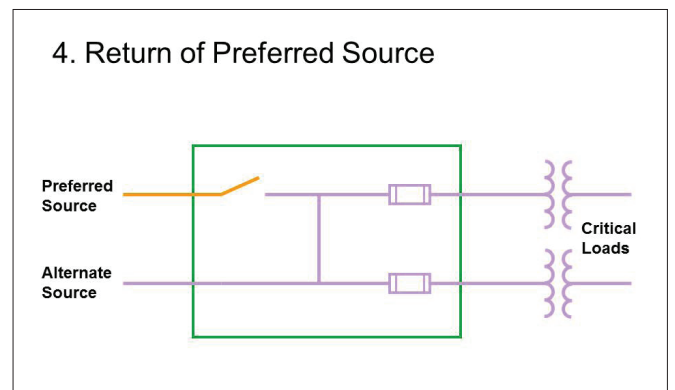
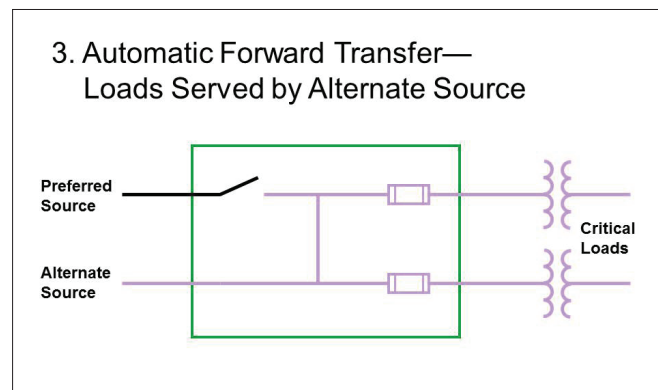
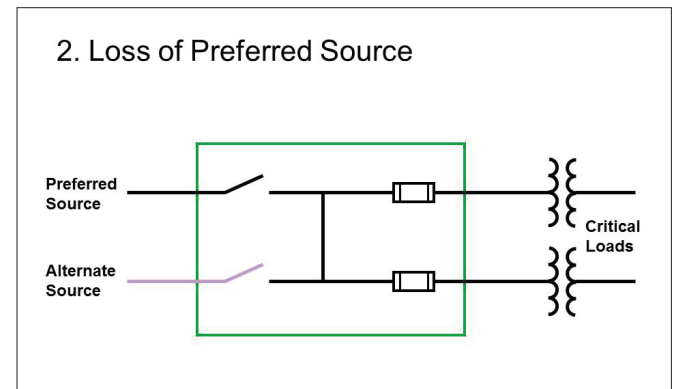
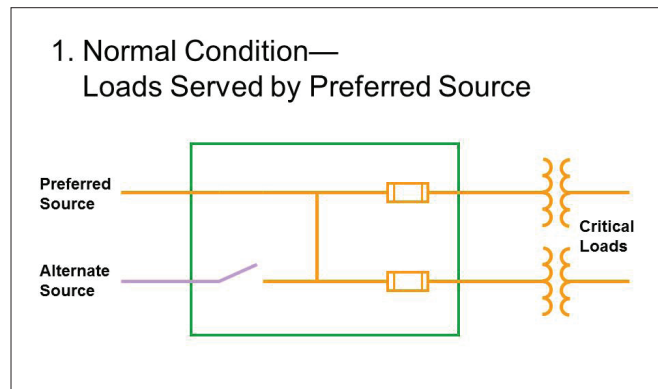
For applications through 25 kV, S&C offers products such as the PureWave® UPS System and PureWave® UPS XT System. These systems transfer the critical loads to a stored energy source during short-duration power quality issues, then to a back-up generator if the issue persists. S&C can also furnish a High-Speed Fault-Clearing System . . . a *no-interruption* system for underground applications through 38 kV. For details on these systems, please visit our website [www.sandc.com](http://www.sandc.com).

# A Basic Example of Automatic Source Transfer: Pad-Mounted Gear Serving a Hospital

Here's an example of automatic source transfer utilizing a unit of S&C Source-Transfer Pad-Mounted Gear.

Upon loss of the preferred utility source, the critical electrical loads of the hospital are transferred to the alternate utility source.

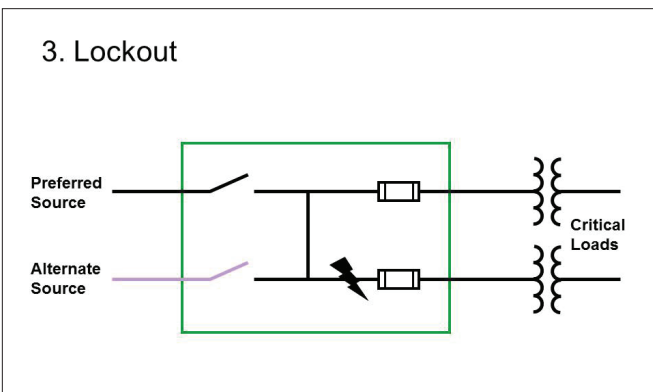
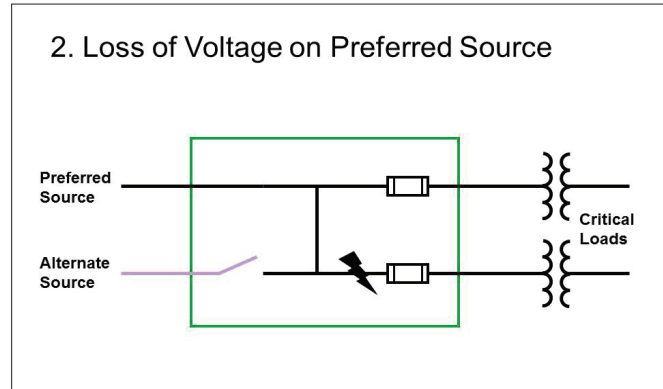
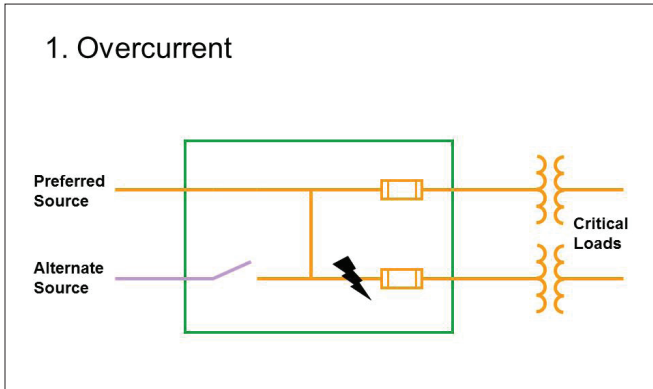
Upon subsequent return of the preferred source, the critical loads are transferred back to the preferred source. The reverse transfer is "open transition" to avoid paralleling the sources. If paralleling of the sources is permissible, "closed transition" reverse transfer may be selected.



## Optional Overcurrent Lockout Feature

S&C's source-transfer solutions, including Source-Transfer Pad-Mounted Gear, can be furnished with an overcurrent lockout feature. This feature prevents an automatic transfer operation that would close a switch into a fault.

If the overcurrent is due to a fault that is cleared by a source-side protective device, the prolonged loss of voltage will cause the associated source-transfer switch to open.





## Automatic Source-Transfer Solutions for Overhead Distribution Systems

Let S&C help you select the solution right for your application, based on system voltage, continuous and interrupting current requirements of the loads,



maximum-permissible source switching time, and requirement for additional automation.

**Integer Style Alduti-Rupter® Switches**, available through 46 kV and up to 1200 A continuous and load interrupting.

Using AS-1A or AS-10 Switch Operators and a Micro-AT® Source-Transfer Control in Weatherproof Enclosure, transfer is achieved with two rotating-mechanism switches in 1.5 seconds maximum, or two reciprocating-mechanism switches in 2.4 seconds maximum.

With two **Double-Break Style Alduti-Rupter Switches** rated 69 kV, 1200 A continuous, and 600 A load interrupting—plus LS-2 Switch Operators and Micro-AT Control—transfer is achieved in 4.4 seconds maximum.

Split-bus application is possible.

### **6801M Automatic Switch Operators**

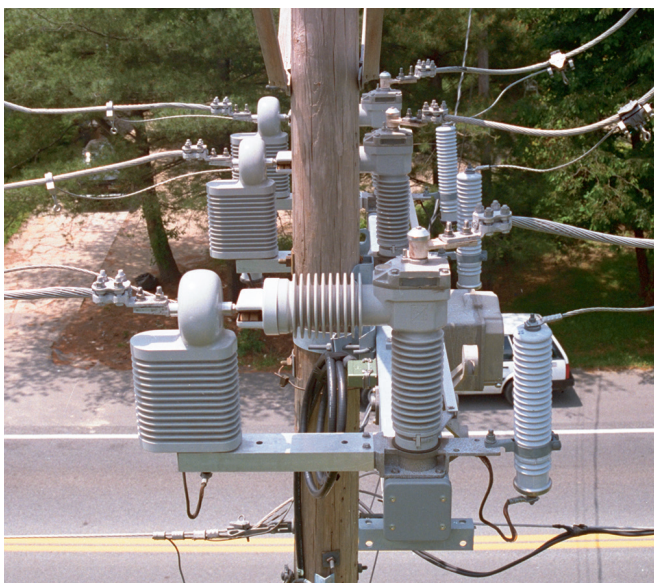
provide 1.0 second maximum transfer time. Include mechanical, SCADA, and communication components in one enclosure. Can be integrated into an IntelliTeam® SG Automatic Restoration System.



**Scada-Mate® Switches**, available through 34.5 kV, up to 900 A continuous, and 630 A load interrupting.

Using a 6802 Automatic Switch Control, transfer is achieved with two Scada-Mate Switches in 2 to 3 seconds. Split-bus application is possible with one 6802 Control and one 6801 Control.

Scada-Mate Switches include sensors for three-phase monitoring of line current and single- or three-phase monitoring of voltage. 6801 and 6802 Controls can be integrated into an IntelliTeam SG Automatic Restoration System.



## Automatic Source-Transfer Solutions for Overhead Distribution Systems



**Scada-Mate CX™ Switches**, available through 25 kV and 900 A continuous and load interrupting.

Using a 6802 Automatic Switch Control, transfer is achieved with two Scada-Mate CX Switches in 2 to 3 seconds. Split-bus application is possible with one 6802 Control and one 6801 Control.

Scada-Mate CX Switches are optionally available with sensors for three-phase monitoring of line current and voltage. 6801 and 6802 Controls can be integrated into an IntelliTeam SG Automatic Restoration System.



**IntelliRupter® PulseClosers**, available through 38 kV, up to 800 A continuous, and up to 16 kA interrupting.

When furnished with the IntelliTeam® SG Automatic Restoration System and SpeedNet™ Radios, IntelliCom® DA Mesh Radios, or fiber-optic modems, transfer is achieved with two IntelliRupters in 1.5 to 1.8 seconds. Using the loop restoration feature, transfer is achieved with two IntelliRupters in 0.6 to 0.8 second.

Not limited to two-way transfer. IntelliRupters include sensors for three-phase monitoring of line current and three-phase monitoring of voltage on both sides of the switch. Communicating IntelliRupters can be integrated into an IntelliTeam SG Automatic Restoration System.



## Summary of Automatic Source-Transfer Solutions for Overhead Distribution Systems

Switching Devices	Voltage, kV	Continuous Current, Amperes	Interrupting Current, Amperes	Type of Switch Operator	Type of Control	Common-Bus Maximum Source-Transfer Time	Suitable for Split-Bus Application?	Suitable for IntelliTeam SG Integration?
Two Integer Alduti-Rupter Switches	Up to 46	Up to 1200	Up to 1200	AS-1A	Micro-AT Control	1.5 sec	Yes	No
				AS-10		2.4 sec	Yes	No
				6801M Automatic Switch Operator		1.0 sec	Yes	Yes
Two Double-Break Alduti-Rupter Switches	69	1200	600	LS-2	Micro-AT Control	4.4 sec	Yes	No
Two Scada-Mate Switches	Up to 34.5	Up to 900	630	Integral	6802 Control	2 to 3 sec	Yes, with one 6802 Control and one 6801 Control	Yes
Two Scada-Mate CX Switches	Up to 25	900	900	Integral	6802 Control	2 to 3 sec	Yes, with one 6802 Control and one 6801 Control	Yes
Two Intelli-Rupter Pulse-Closers	Up to 38	Up to 800	Up to 16000	Integral	Integral	1.8 sec using IntelliTeam SG and approved communication devices. 0.8 sec using loop restoration	Yes	Yes

## Automatic Source-Transfer Solutions for Underground Distribution Systems

Let S&C help you select the solution right for your application, based on system voltage, continuous and interrupting current requirements of the

loads, number of loads, maximum-permissible source switching time, and requirement for additional automation.



**Source-Transfer Pad-Mounted Gear**, available through 27 kV, 600 A continuous and load dropping, and up to 14 kA, RMS, symmetrical short-circuit. Includes Mini-Rupter® Switches with stored-energy switch operators, plus Micro-AT Source-Transfer Control or 6802 Automatic Switch Control.

Transfer is achieved in about ½ second with Micro-AT Control, or 3 seconds with 6802 Control. Common bus only. 6802 Control can be integrated into an IntelliTeam SG Automatic Restoration System.

Serves one or two critical loads.



**Source-Transfer Vista® Underground Distribution Switchgear**, available through 38 kV, 630 A continuous and load dropping, and up to 25 kA, RMS, symmetrical short-circuit. Includes motor-operated load-interrupter switches, plus Micro-AT Source-Transfer Control or 6802 Automatic Switch Control.

Transfer is achieved in about 6 seconds with Micro-AT Control or 6802 Control. Split-bus application is possible with two 6802 Controls. 6802 Control can be integrated into an IntelliTeam SG Automatic Restoration System.

Serves up to three critical loads.



## Automatic Source-Transfer Solutions for Underground Distribution Systems



**System VI™ Switchgear**, available through 38 kV, 630 A continuous and load dropping, and up to 25 kA, RMS, symmetrical short-circuit. Includes motor-operated load-interrupter switches, plus Micro-AT Source-Transfer Control or 6802 Automatic Switch Control.

Transfer is achieved in about 6 seconds with Micro-AT Control or 6802 Control. Split-bus application is possible with two 6802 Controls. 6802 Control can be integrated into an IntelliTeam SG Automatic Restoration System.

Serves any number of critical loads. Can be furnished with a variety of metering options.



**PMX™ Modular Metal-Enclosed Switchgear**, available through 27 kV, 600 A continuous and load dropping, and up to 25 kA, RMS, symmetrical short-circuit. Includes Mini-Rupter Switches with PM Switch Operators, plus Micro-AT Source-Transfer Control (in Source-Transfer Entrance Module) or 6802 Automatic Switch Control (in Remote Supervisory Entrance Module).

Transfer is achieved in about ½ second with Micro-AT Source-Transfer Control, or 3 seconds with 6802 Control. 6802 Control can be integrated into an IntelliTeam SG Automatic Restoration System.

Common bus only. Serves any number of critical loads. Can be furnished with a variety of metering options.

## Automatic Source-Transfer Solutions for Underground Distribution Systems

**Power-Operated Custom Metal-Enclosed Switchgear**, available through 38 kV, up to 2000 A continuous, and up to 40 kA short-circuit. Includes Mini-Rupter Switches with MS-2 Switch Operators or Alduti-Rupter Switches with AS-30 Switch Operators, plus Micro-AT Source-Transfer Control.

Transfer is achieved in as little as 20 to 25 cycles with Mini-Rupter Switches, or about 3 seconds with Alduti-Rupter Switches.

Common bus or split bus. Serves any number of critical loads. Can be furnished with a variety of metering options as well as a second Micro-AT Control to permit transfer to a back-up generator.



**Pad-Mounted Style IntelliRupter PulseClosers**, available through 27 kV, 630 A continuous, and up to 16 kA interrupting.

When furnished with the IntelliTeam® SG Automatic Restoration System and SpeedNet™ Radios, IntelliCom® DA Mesh Radios, or fiber-optic modems, transfer is achieved with two IntelliRupters in 1.5 to 1.8 seconds. Using the loop restoration feature, transfer is achieved with two IntelliRupters in 0.6 to 0.8 second.

Not limited to two-way transfer. IntelliRupters include sensors for three-phase monitoring of line current and three-phase monitoring of voltage on both sides of the switch. Communicating IntelliRupters can be integrated into an IntelliTeam SG Automatic Restoration System.



## Summary of Automatic Source-Transfer Solutions for Underground Distribution Systems

Switching Device	Voltage, kV	Continuous and Load Dropping Current, Amperes	Short-Circuit Current, kA, RMS, Sym.	Maximum Number of Critical Loads	Type of Control	Common-Bus Maximum Source-Transfer Time	Suitable for Split-Bus Application?	Suitable for IntelliTeam SG Integration?
Source-Transfer Pad-Mounted Gear	Up to 27	600	Up to 14	Up to 2	Micro-AT Control	0.5 sec	No	No
					6802 Control	3 sec	No	Yes
Source-Transfer Vista Switchgear	Up to 38	630	Up to 25	Up to 3	Micro-AT Control	6 sec	No	No
					6802 Control		Yes, with two 6802 Controls	Yes
System VI Switchgear	Up to 38	630	Up to 25	Any Number	Micro-AT Control	6 sec	No	No
					6802 Control		Yes, with two 6802 Controls	Yes
PMX Switchgear	Up to 27	600	Up to 25	Any Number	Micro-AT Control	0.5 sec	No	No
					6802 Control	3 sec	No	Yes
Power-Operated Custom Metal-Enclosed Switchgear	Up to 38	Up to 2000 Continuous; Up to 1200 Load Dropping with Alduti-Rupter Switches	Up to 40	Any Number	Micro-AT Control	20 to 25 cycles with Mini-Rupter Switches; 3 sec with Alduti-Rupter Switches	Yes, with Micro-AT Control	No
Two Pad-Mounted IntelliRupter PulseClosers	Up to 27	630	Up to 16	Any Number	Integral	1.8 sec using IntelliTeam SG and approved communication devices. 0.8 sec using loop restoration	Yes	Yes





## Choice of Automatic Source-Transfer Controls

Some of S&C's automatic source transfer solutions include a Micro-AT<sup>®</sup> Source Transfer Control. Others include a 6800 Series Automatic Switch Control. And some are available with either device. IntelliRupter<sup>®</sup> PulseClosers feature their own proprietary control group which can provide automatic source transfer functionality.

So what's the right control for your application?

The **Micro-AT Source-Transfer Control** was specifically developed for automatic source transfer and is very easy to configure. No personal computer is needed. But with a PC, you can download events from the optional communications card of the control.

Remote indication and control functions are also available on the Micro-AT Control. If communication to SCADA is required, a separate remote terminal unit must be furnished.



Micro-AT Source-Transfer Control.

physically brought to the same unit of switchgear. The controls communicate with each other and to SCADA via radio or fiber-optics, using DNP3 protocol. A personal computer is required to configure the controls and analyze events.

**IntelliRupter PulseCloser includes a control group** consisting of a protection and control module and a communication module. In addition to automatic source transfer—with or without a SpeedNet<sup>™</sup> Radio or IntelliCom<sup>®</sup> DA Mesh Radio—the control group permits application in an IntelliTeam SG Automatic

**6800 Series Automatic Switch Controls** combine a switch control, remote terminal unit, and battery management system/automation control in a single package. In addition to automatic source transfer, these controls can provide automatic sectionalization. And they can be integrated into an IntelliTeam<sup>®</sup> SG Automatic Restoration System, permitting load restoration from multiple sources.

6800 Series Automatic Switch Controls are ideal for applications where the two utility sources can't be

Restoration System, as well as automatic loop restoration and SCADA applications. The control group is configured and operated via secure WiFi connection to a personal computer.



6800 Automatic Switch Control.



IntelliRupter Protection and Control Module.



IntelliRupter Communication Module.

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