Federal Pacific

GRIDCONNEX®
Federal Pacific

Medium Voltage Grid Connection Solutions for Solar Farms, Battery Energy Storage Systems and Other Distributed Generation

Why GridConnex?

GridConnex is an excellent alternative to traditional pole mount medium voltage service equipment for the solar, battery storage, or wind energy provider.

Gridconnex Advantages

Significantly reduces installation time while remaining aesthetically pleasing.

The GridConnex product offers a significant reduction in installation time. A single GridConnex is capable of replacing 4 to 5 poles! This allows for rapid deployment and ease of installation.

Before GridConnex

After GridConnex

Not only is the pad-mounted GridConnex product easier and quicker to install, gain the benefit of an aesthetically pleasing alternative to unsightly utility poles.

GridConnex Advantages

Exceptionally reliable, easy to service, and cost-effective.

GridConnex is exceptionally reliable because it is wired and tested in the factory. Also, the equipment is housed in a sturdy, environmentally controlled, II-gauge steel enclosure. Assuring the components are not vulnerable to vandalism, vermin, lightning, or storms.

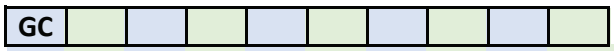
Since GridConnex is a pad-mounted product, serviceability is greatly improved. Bucket truck deployment is not needed to service equipment. Just open the door!

GridConnex is cost-effective because many required components are combined into a single enclosure. Simply stated, gang-operated air brake switches, reclosers, control power transformers, metering clusters, and fuse cutouts can be replaced with one prefigured product. The field labor savings are substantial.

A fully loaded GridConnex product will include revenue grade metering, a visible disconnect for safe isolation and the ability to lockout, and circuit breakers replacing very expensive reclosers. (GridConnex comes standard with three independent circuit breakers. Tripping is three-phase, but open phase commissioning is possible with safe individual phase tripping).

How to Order: Select from the options below. If your requirements are not listed, please contact Federal Pacific at **https://www.federalpacific.com/contact/**

GridConnex Configured Number Designations



Enclosure Color
WH - White (Standard)
GN - Green (Munsell 7GY3.29/1.5)
GY - Grey (ANSI 61)

Feeder Protection
0 - None
1 - Yes (50/51 Relay and Test Switch)
2 - Yes (50/51 Relay, Test Switch & Vsync LEA)

Revenue Grade Metering
0 - None
1 - Yes (Current / Voltage Measuring, Meter, Test Switch)

Uninterruptable Control Power
C - Customer Supplied
F - Factory Supplied

Lightning Arrestors
0 - None
1 - Utility Side
2 - Solar Side
3 - Both Utility and Solar Side

Visable Disconnect
AJ - Autojet Switch
XX - No Visable Disconnect

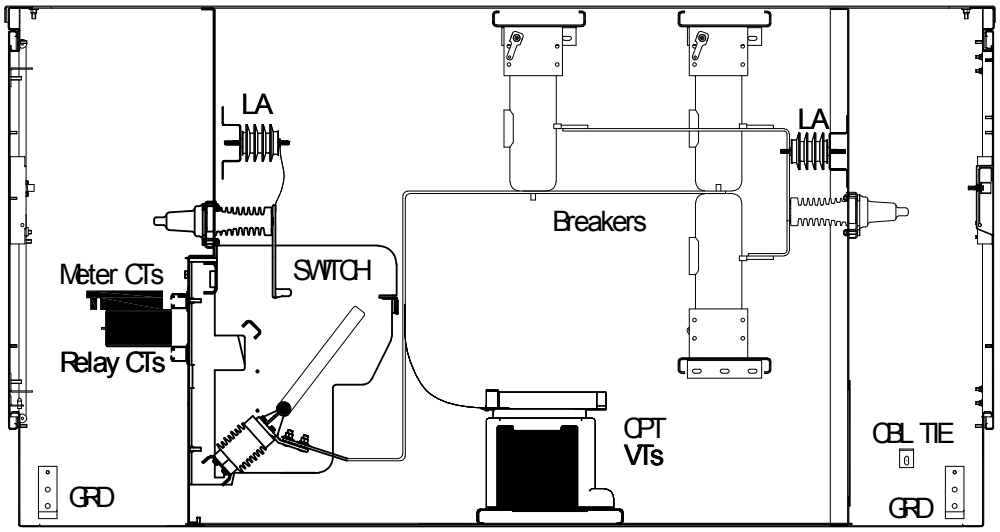
Breaker Configuration
1 - Triple Single Phase Breakers
3 - Three Phase Breaker

Bushings
2 - 200 Amp
6 - 600 Amp

System Voltage
A - 12,470
B - 13,200
C - 13,800
D - 14,400
E - 22,860
F - 24,940
G - 34,500
X - Other (Please Specify)

Product Designation
GC - GRIDCONNEX

The example below depicts a section view and one-line diagram of a typical configured GridConnex. See the configuration key located on page 4 for available options.



GridConnex with Switch (Typical, 15kV Shown) - Section View

Part Number GCA61AJ3F11WH

Position	0	1	2	3	4	5	6	7	8	9
Configured Part Number										

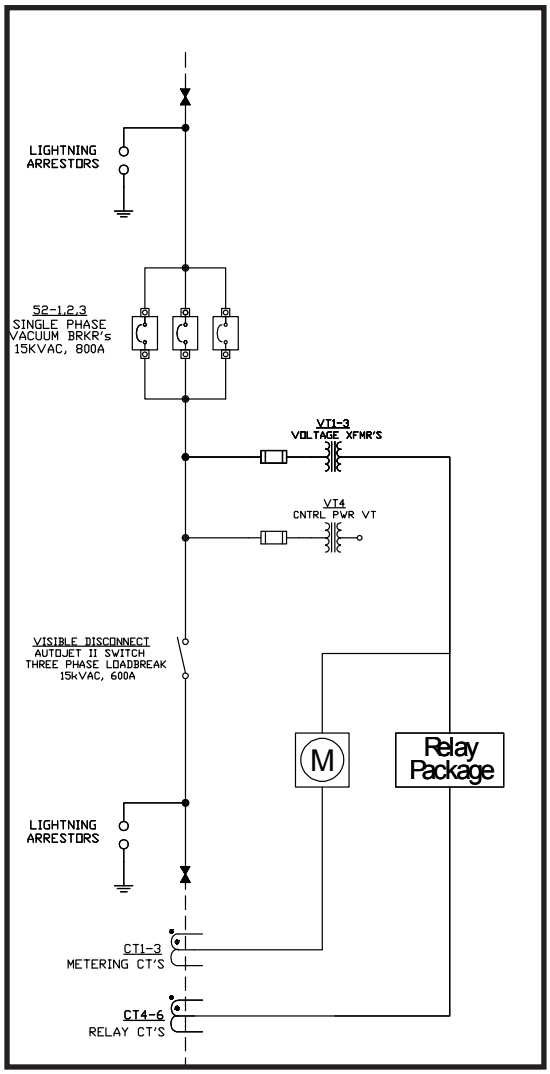
GridConnex™ Overall Equipment Ratings					
Rated Voltage	**Continuous Current**	**Frequency**	**Basic Impulse Level (BIL)**	**Dielectric Strength**	**Rated Short-Circuit Current (SYM)**
15kV	200/600A*	60Hz	95kV	36kV	20kA
25kV			125kV	60kV	16kA
35kv			150kV	80kV	

* Continuous current rating based on bushing or bushing well selection. Switchgear conforms to selected ANSI, NEMA, and IEEE standards.

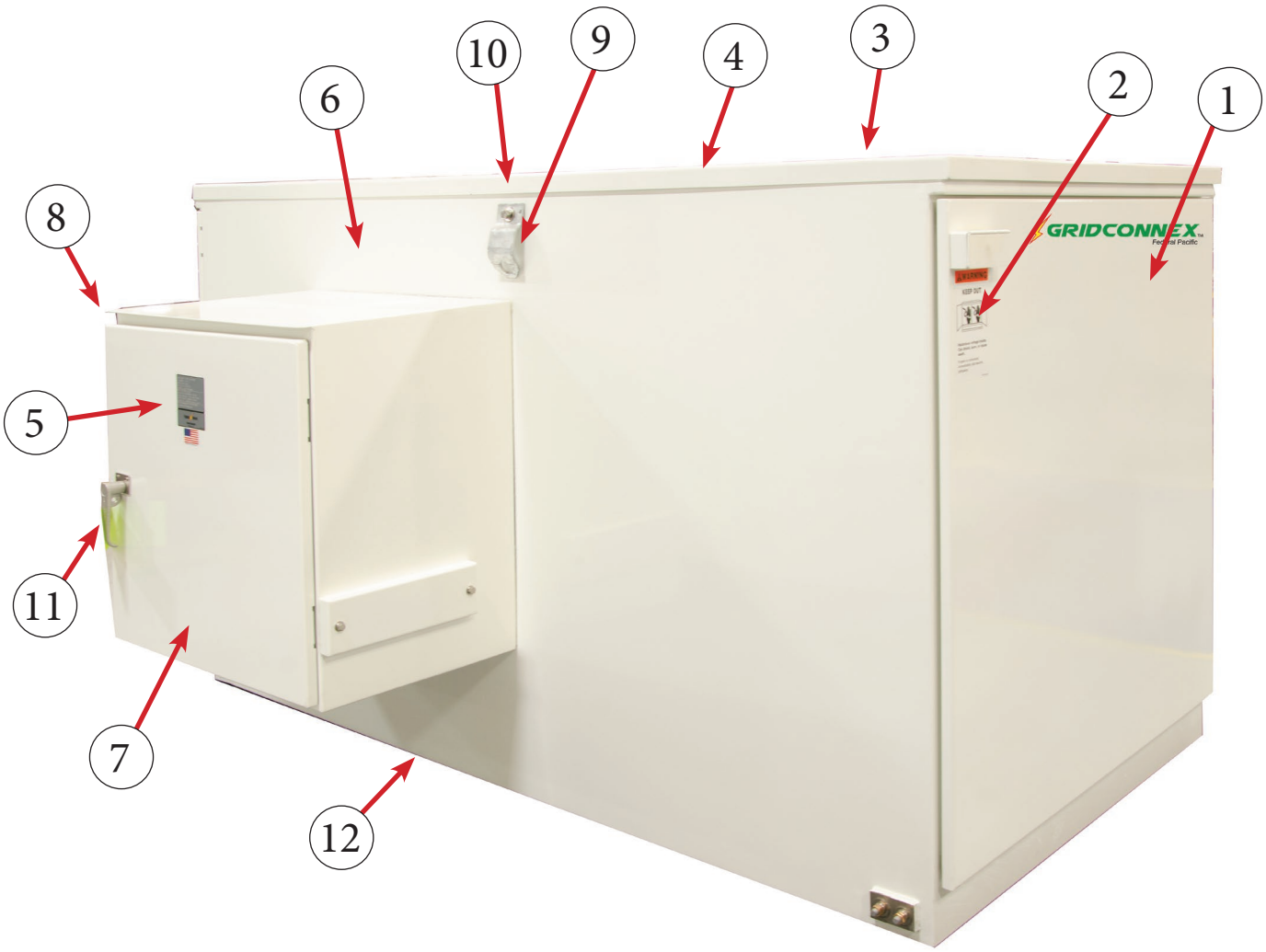
GridConnex Typical Dimensions - With AJ Switch			
Rated Voltage	**Height**	**Width**	**Depth**
15kV	56	48	104
25kV	72	60	116
35kV	85	57	132

GridConnex Typical Dimensions - Without AJ Switch			
Rated Voltage	**Height**	**Width**	**Depth**
15kV	56	48	82
25kV	72	60	106
35kV	85	57	122

NOTE - All dimensions in inches

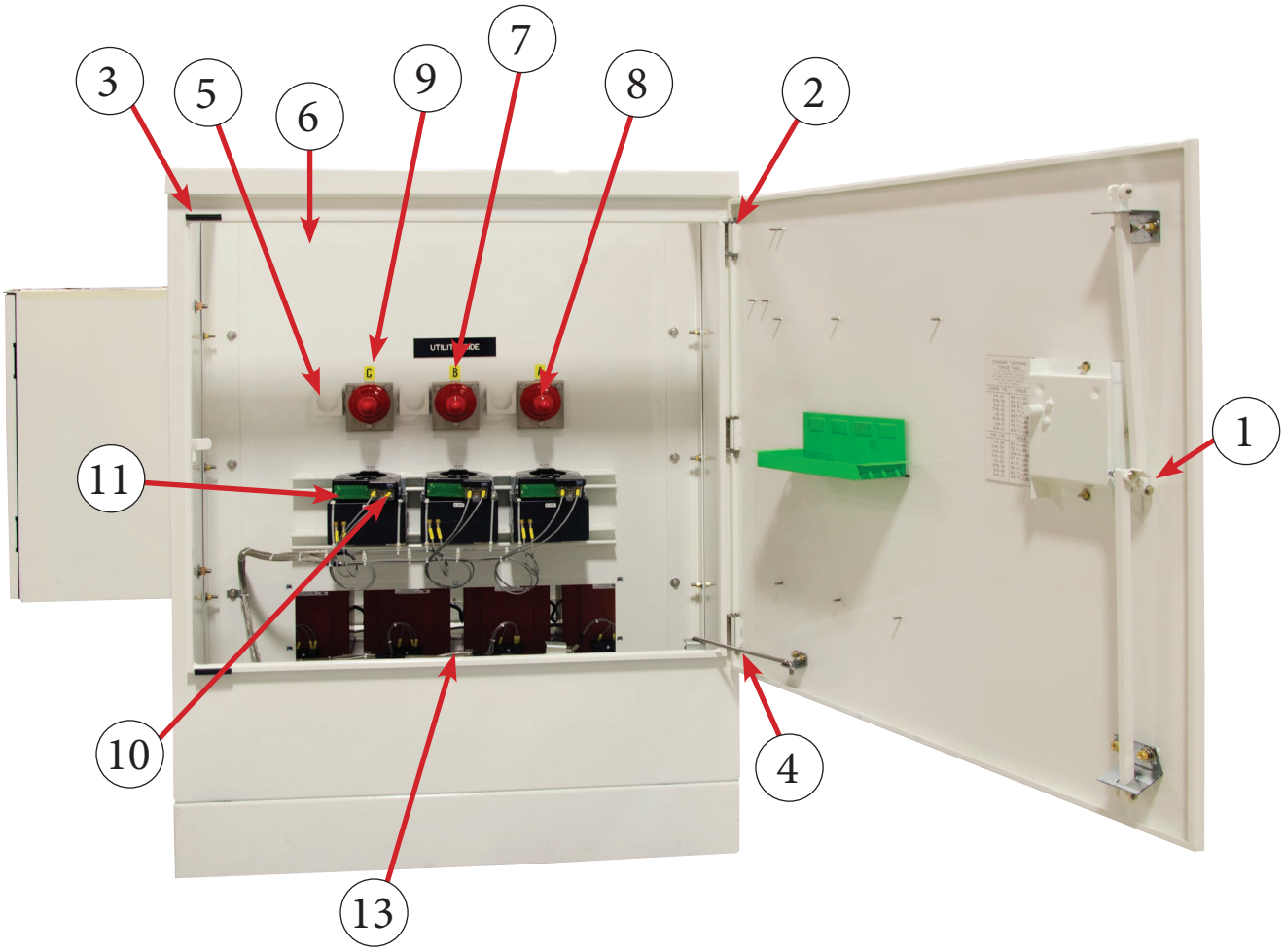


Typical One-Line Diagram



Enclosure Exterior of Federal Pacific Pad-Mounted GridConnex Solution.

1. II-Gauge Steel Doors
2. Hazard-Alerting Warning Signs on Exterior
3. One-Piece, Cross-Kinked II-Gauge Steel Roof
4. Insulating No-Drip Compound on Underside of Roof
5. Silk-Screened, Aluminum Stamped Nameplate
6. II-Gauge Steel Welded Enclosure
7. Control Compartment Sealed to Enclosure
8. Drip-Shield over Control Compartments
9. Galvanized-Steel Lifting Brackets
10. Closed-Cell Cushions Isolate Enclosure from Lifting Bracket
11. Stainless-Steel Handles on Control Compartment
12. Closed-Cell Gasket at Bottom Isolates Enclosure from Mounting Surface



Customer Connection / Current Transformer Compartment.

I. II-Gauge Steel Doors with 3 point Latching System
2. Three Stainless Steel Hinges and Hinge Pins Per Enclosure Door
3. Bumper Gasket Cushions Door Interface, Prevents Metal to Metal Contact
4. Stainless Steel Wind brace
5. Stainless Steel Parking Stand for each Bushing
6. Formed Steel Equipment Mounting Panels Isolate Medium Voltage Components from Termination Compartment.
7. 600 Amp Cycloaliphatic Epoxy Bushings with All-Copper Conductor on Stainless Steel Clamping Bracket (optional 200A Bushing Wells)
8. Removable Silver Plated All-Copper Stud on all Bushing with Red Protective Dust Covers.
9. Phase Identification Labels
I0. Relay Current Transformers (when present)
II. Revenue Grade Current Transformers (when present)
I3. Wide View Clear Polycarbonate Window for Volting Transformer Fuse Access. (when present)

Construction

Enclosure Construction

Standard Enclosure features include heavy, 11-gauge hot-rolled pickled-and-oiled steel, all-welded construction, cross-kinked roof to eliminate potential for standing water, stainless steel hinges and switch operating pockets, deadfront compartment access doors with 3-point auto-latch door mechanisms and padlockable door handles with penta-head security bolts. These standard features, along with a rugged tamper-resistant design, provide a unit that meets the stringent security requirements of IEEE C57.12.28.

Enclosure Finish

The electrostatically deposited, baked-on powder epoxy finish provides a tough, durable high glass finish with protective qualities to ensure long-term enclosure protection. The standard color is white. Consult the factory for custom colors.

Bushings and Bushing Wells

Insulators of cycloaliphatic epoxy (CAE) polymers have been used in the power industry for over fifty years and have proven field experience globally in both indoor and outdoor applications. These polymers are light-weight, homogeneous, and readily molded by automatic pressure gelation (APG) process in both simple and complex contours. The formulation is balanced for high voltage, high strength, non-tracking, self-scouring, non-weathering applications in extremes of high temperature and sub-zero cold.

Federal Pacific's bushings and bushing wells are of cycloaliphatic epoxy and meet all the criteria set forth in ANSI/IEEE 386, which establishes ratings and design interface to accommodate industry-standard insulated separable elbow connectors. All bushings and bushing wells feature high conductivity copper rod contacts and include removable silver-plated copper studs. In addition, bushings and bushing wells all carry an engraved serial number for quality audit if the need should ever arise and are traceable to the particular switchgear assembly.

Federal Pacific cycloaliphatic bushings and bushing wells have all copper conductors and silverplated removable studs. Semi-conductive coating isolate bushings and dust covers protect high-voltage interfaces

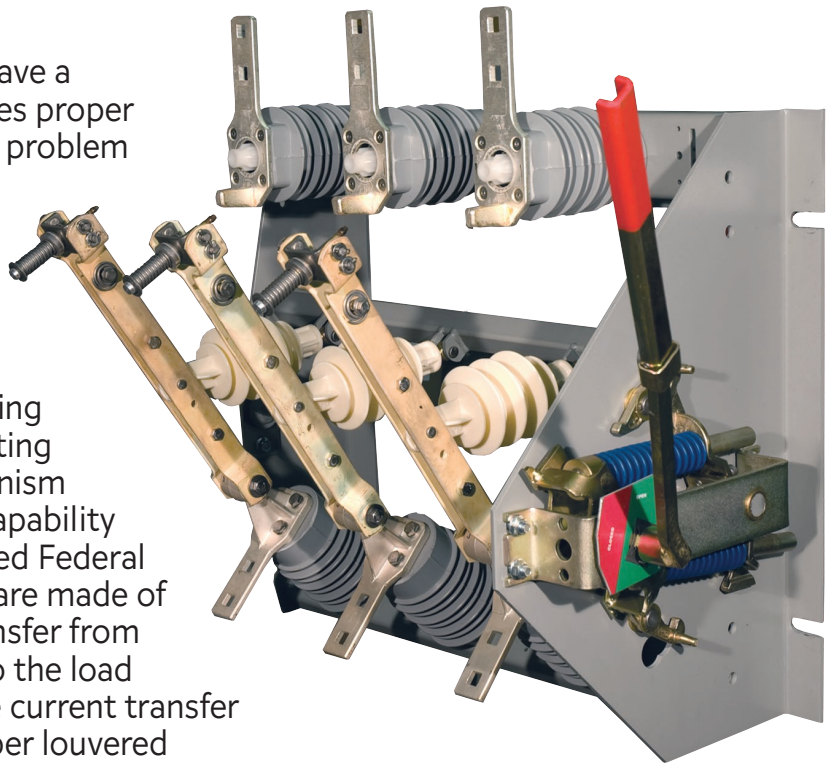
Circuit Protection Devices

The Tavrida Circuit Breaker Modules contain the most advanced design elements of any MV breaker on the market. All components are assembled along a single axis, with three mono-stable magnetic actuators (one per pole). The actuators are mounted in a steel frame and are mechanically linked by a synchronizing shaft. The actuators drive a pulling insulator that, in turn, connects to the advanced Tavrida vacuum interrupters at the top of the breaker. This simple design results in the highest reliability available today. Tavrida delivers a maintenance-free breaker with a life expectancy of up to 150,000 close-open operations. The CM_16 Control Module serves as the interface between the Circuit Breaker Module and the Schweitzer SEL-751 relay.

Meets or exceeds IEEE C34.04, C37.06, C37.09, C37.09a and IEC 62271-100
ETL Recognized

Vacuum Circuit Breaker Ratings						
Rated Voltage	**Rated Current**	**Short Circuit Current**	**BIL kV**	**Frequency (Hz)**	**Manufacturer**	**Breaker Type**
5-15kV	800A	20kA	95	60	Tavrida	LD
27kV	800A	16kA	125	60		LD
35kV	1200A	16kA	150	60		OSM

Auto-Jet Switch



All Federal Pacific Auto-Jet switches have a heavy-gauge steel frame, which assures proper contact alignment and eliminates any problem of switch-to-enclosure alignment. An optional stainless-steel switch is available (current-carrying parts are not stainless-steel). A quick-make, quick-break stored-energy mechanism with heavy-duty, long-life die springs provides high-speed opening and closing independent of the operating handle speed. This high-speed mechanism assures the duty-cycle fault-closing capability and load interruption with the patented Federal Pacific interrupter. The switch blades are made of high conductivity copper. Current transfer from the switch-blade through the hinge to the load terminals is accomplished by a unique current transfer means, consisting of a beryllium-copper louvered contact band encircling a copper pin at the hinge point. Magnetic forces, due to a higher-than-normal current flow, tend to rotate the louvers on the contact band toward a vertical position, providing a higher contact pressure for fault-current duty.

Switch Ratings						
kV		Amperes				60 Hz Withstand
Nom.	Max. Design	Continuous & Interrupting	Momentary RMS ASYM*	Fault-Closing RMS ASYM	BIL kV	
14.4	17	600	40,000	40,000	95	36
25	27	600	40,000	40,000	125	60
34.5	38	600	40,000	40,000	150	80

* The Auto-Jet switch has a three time fault close capability at 40kA and a single time fault close capability at 61kA.

Current and Voltage Sensing

Relay Class Current Transformers provide overcurrent sensing
Standard relay class of C50.
Manufactured to meet the requirements of IEEE C57.13
UL and CSA Recognized

Metering Class Extended range high accuracy current transformers for revenue grade metering.
IEEE 0.15 accuracy class from 1% of rated current though rating factor.
Manufactured to meet the requirements of IEEE C57.13

Revenue grade voltage transformers for voltage sensing and metering.
Accuracy class – 0.3% WXMY at 100% rated voltage
Manufactured to meet the requirements of IEEE C57.13
UL and CSA Recognized

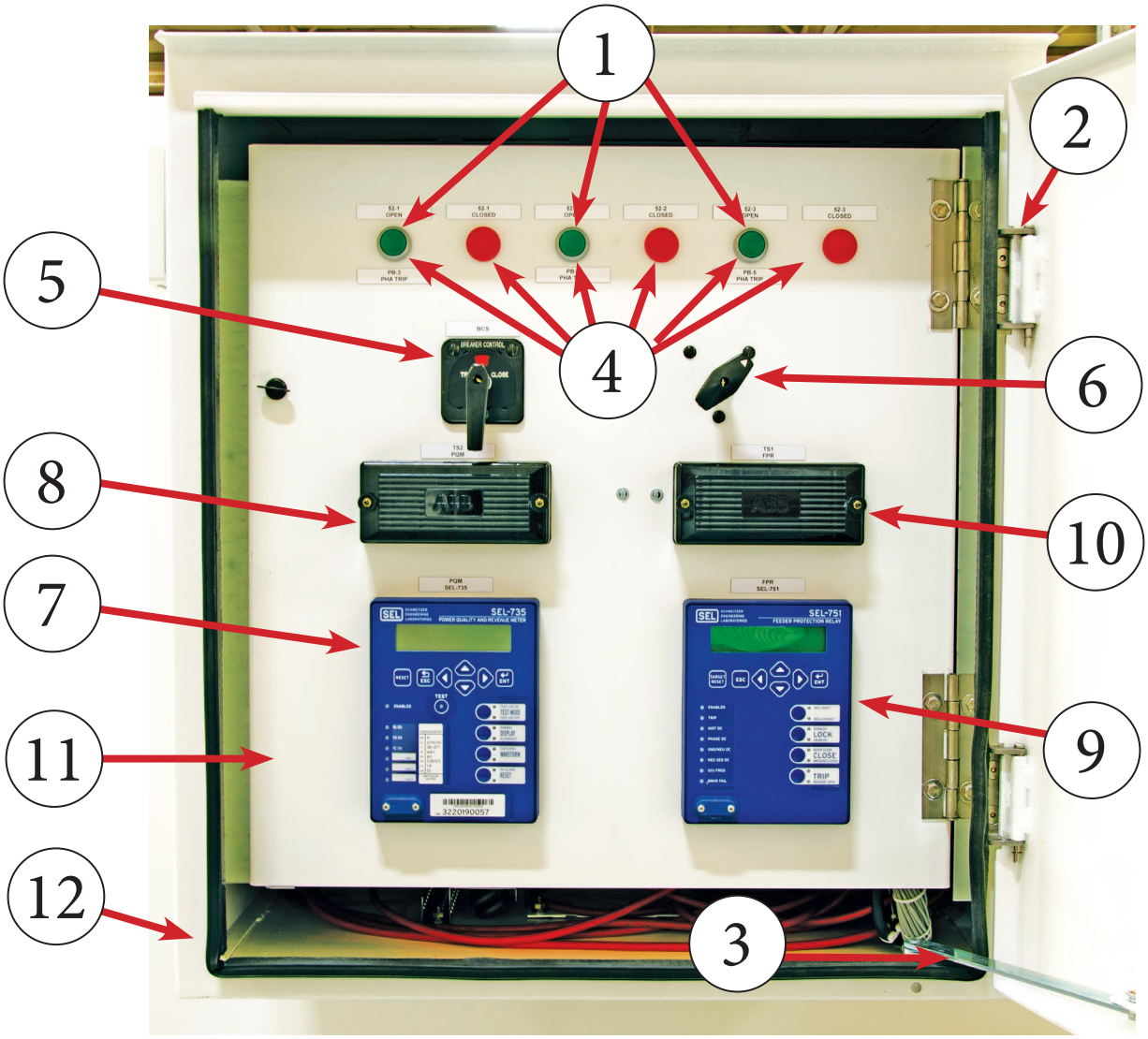
Uninterruptible Power Supply

The supplied UPS provides adequate battery backup for the SEL-751 relay, SEL-735 meter, and vacuum circuit breakers when control power has been lost regardless of cause. The UPS ensures that the equipment is always capable of performing its intended function whether or not the normal control-power source, the voltage transformers, is available. The UPS also includes a battery charger and associated alarm circuits (1) in the event AC input to the battery charger is diminished or lost and (b) output from the battery is diminished below acceptable levels or lost.

Optional Accessories

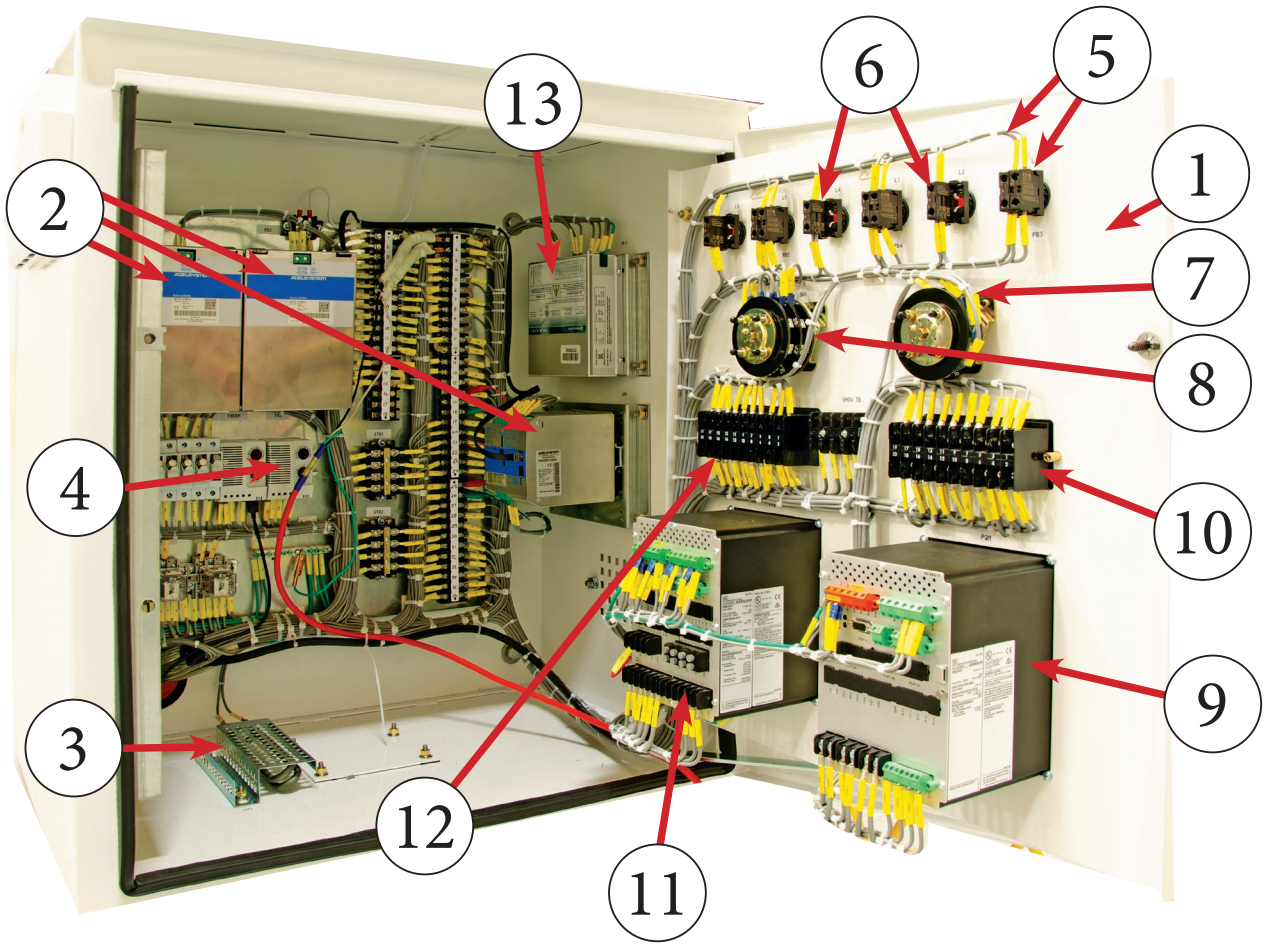
Lightning Arrestors – Distribution class surge arrestors are used to limit the voltage due to lightning strikes and/or switching transients. Arrestors can be located at the Utility connection point, DG connection point, or at both locations.

Low-Energy Analog Voltage Sensors (LEAs) – Sensor is used in conjunction with VTs and the SEL-751 relay to coordinate voltage sync between the Utility and Solar Farm / Battery Energy Storage Systems / Other DGs.



Low-Voltage Control Compartment (typical).

1. Individual Phase Trip Pushbuttons for Commissioning.
2. Stainless Steel Hinges and Hinge Pins
3. Stainless Steel Wind brace
4. Breaker Open / Close Indication LED's
5. Breaker Control Switch
6. Local / Remote Control Switch
7. SEL-751 Feeder Protection Relay (optional)
8. FT Style Test Switch (when present)
9. SEL-735 Power Quality and Revenue Meter (optional)
10. FT Style Test Switch (when present)
11. Swing-Out Control Panel
12. Fully Gasketed Door Opening on Low Voltage Control Compartment



Low-Voltage Control Compartment (Interior, typical)

1. Swing-Out Control Panel. (Door-in-Door Construction)
2. UPS for Continuous Control Power. (optional)
3. Heater for Compartment Interior
4. Humidistat / Thermostat
5. Individual Phase Trip Pushbuttons for Commissioning
6. Breaker Open / Close Indication LEDs
7. Breaker Control Switch
8. Local / Remote Control Switch
9. SEL-75I Feeder Protection Relay (optional)
10. FT Style Test Switch (when present)
11. SEL-735 Power Quality and Revenue Meter (optional)
12. FT Style Test Switch (optional)
13. Breaker Control Module

Relays and Metering

The Federal Pacific GridConnex equipment uses the Schweitzer SEL-751 relay for feeder protection. Comprehensive protection capabilities, including time overcurrent, directional overcurrent, auto-reclosing, over-/undervoltage, frequency, cable/line thermal, and more.

Standard offering includes:

Directional Power Detection

2x16 LCD with 4 Push Buttons

Ethernet and EIA-485 communications with optional Multi-Mode Fiber ST

Current Inputs (Optional Voltage Inputs)

LEA Vsync / Vbat (300Vdc / 4 Arc-Flash Detection Inputs (Optional)

Meets IEC 60255-26:203, IEC 60255-27:2013, UL 508, CSA C22.2 No. 14-05

UL Listed to U.S. and Canadian Safety Standards.

Revenue Grade metering is accomplished by incorporating Metering class CTs and VTs with the Schweitzer SEL-735 meter. The SEL-735 ensures high-accuracy measurements with a ±0.06 percent watt-hour (Wh) guarantee at unity power factor and a ±0.02 percent typical rating.

Standard offering includes:

Basic PQ and recording 128MB, 16 Channels of LDP, 1 kHz waveform, 270 VSSI summary events, and up to 15th-order harmonics

Form 9 (Four-Wire Wye, 3Ps 3 CTs Meter Form)

Ethernet and EIA 485 Communications

Current and voltage inputs optimized for low-end accuracy

Various supported communication protocols including Standard SEL ASCII, SEL LMD, SEL FastMeter, SEL Compressed ASCII, MV-90 Transition, Modbus RTU/TCP, Mirrored Bits Communications, Telnet, DNP3 Level 2 Outstation and LAN/WAN, and Syncrophasors.

Meets ANSI C12.1-2014, IEC 62052-11:2013.

UL Listed to U.S. and Canadian Safety Standards.

Electro-Mechanical Overview

Electro-Mechanical is an American-owned company founded in 1958. It is headquartered in Bristol, Virginia (USA) and for more than 60 years has manufactured a wide variety of products used in the generation, transmission, distribution and control of electricity. These products, along with various electrical equipment repair and maintenance services, are used by a diverse mix of Energy (coal, oil, and gas), Electric Utility and Industrial customers worldwide. Federal Pacific medium-voltage metering, collector, and gird connection gear for the renewable markets is offered under the GridConnex® trade name.

Electro-Mechanical has earned a "customer oriented" reputation by keeping its focus on providing the best value to its customers through quality products and services. With six manufacturing companies and two repair and service companies, Electro-Mechanical has over 650,000 square feet of modern manufacturing facilities, located in Virginia and Mexico.

Electro-Mechanical consists of:

Federal Pacific - Dry-type transformers from .050 KVA through 10,000 KVA single and three phase, up to 25 kV, 110 kV BIL with UL® approval through 15 kV; Vacuum pressure impregnation and vacuum pressure encapsulation. Medium voltage switchgear including air-insulated live-front, dead-front, SCADA-controlled, automatic transfer, primary metering and wall-mounted pad-mounted and metal-enclosed switchgear. The quality systems of Federal Pacific have been certified by DQS Inc. to the ISO 9001:2015 Standard.

Federal Pacific

Line Power Manufacturing - Custom engineered electrical distribution and control apparatus including low and medium voltage metal-enclosed switchgear, power control centers, motor controls, and substations. Electrical power distribution systems and components used in mining. The quality systems of Line Power have been certified by DQS Inc. to the ISO 9001:2015 Standard.

MAFESA - Electro-Mechanical's manufacturing facility in Mexico for stock low-voltage transformers.

Engineered Solutions - Innovative engineered solutions are offered by Federal Pacific and Line Power meeting specific customer application needs. Products include custom medium voltage switchgear serving data centers and renewable energy, switchgear value propositions, and portable substations.

Line Power Manufacturing

Line Power Parts & Rebuild - New parts, complete electrical equipment remanufacturing and onsite electrical equipment service. The parts service department provides replacement components manufactured by Electrical Group companies as well as commonly used OEM parts.

Mirus International, Inc. - Designs and develops world class power quality improvement products for mission critical operations. Our specialized product line includes highly efficient harmonic filters, transformers, autotransformers and Data Center power distribution equipment. Mirus' solutions minimize disruption to the power supply, improve reliability and adhere to the strictest of regulatory requirements while also saving energy and reducing operating costs.

Mirus International

Federal Pacific Switchgear Products

Live-Front Pad-Mounted Switchgear - 15 kV • 27 kV
    Manual, Automatic Transfer, Remote Supervisory Controlled Models
Live-Front/Dead-Front Pad-Mounted Switchgear - 15 kV • 27 kV
    Manual, Automatic Transfer, Remote Supervisory Controlled Models
Dead-Front Pad-Mounted Switchgear - 15 kV • 27 kV
    Manual, Automatic Transfer, Remote Supervisory Controlled Models
Pad-Mounted Capacitor Banks
Primary Metering Dead-Front Pad-Mounts - 15 kV • 27 kV • 38 kV
Fused Sectionalizer Dead-Front Pad-Mounts - 15 kV • 27 kV
Metal-Enclosed Switchgear - 5 to 38 kV
    Manual, Automatic Source Transfer, Remote-Supervisory Control, Shunt Trip
Wall-Mounted Equipment - 15 kV • 27 kV
    Wall-Mounted Switch Cabinets, Wall-Mounted Fuse Cabinets
Unit Substations - 5 to 38 kV
Vacuum Reclosers - 15 kV
Custom-Engineered Products - 5 to 121 kV
    Portable Substations - Trailer, Skid and Track Mounted
Components
    Micro-Processor and Stored-Energy Switch Operators, SCADA-Controlled Switch Operators

Federal Pacific Dry-Type Transformer Products

Industrial Control - 50 through 750 VA
Encapsulated 600 Volt Class
    Three-Phase 3 through 15 kVA • Buck-Boost 50 VA through 5 kVA • Single-Phase 50 VA through 25 kVA
Ventilated 600 Volt Class
    Single-Phase 15 through 167 kVA • Three-Phase 15 through 1000 kVA • K-Factor Rated
    Three-Phase 15 through 500 kVA • Motor Drive Isolation Three-Phase 7.5 through 750 kVA
High Voltage General Purpose
    Three-Phase 2.4 and 5 kV Class, 15 through 1500 kVA • Three-Phase 8.6 and 15 kV Class, 112.5 through 1500 kVA
Pad-Mounted
    Single- and Three-Phase 2.4, 5 and 15 kV Class, 112.5 through 2500 kVA
Unit Substation and High Voltage Power
    Three-Phase 2.4 through 25 kV Class, 112.5 through 10000 kVA High Voltage General Purpose
    Three-Phase 2.4 and 5 kV Class, 15 through 1500 kVA • Three-Phase 8.6 and 15 kV Class, 112.5 through 1500 kVA
Vacuum Pressure Impregnated (VPI) and Vacuum Pressure Encapsulation (VPE)
    600 Volt Class through 25 kV Class, 112.5 through 10000 kVA
Specialty Transformers
    600 Volt Class through 25 kV Class, 50 VA through 10000 kVA
ABS Certified Marine Duty Transformers for Marine, Petro-Chem and Offshore Applications

FP-GRIDCONNEXSOLUTIONS-04/2022
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