

Type PKC[™] Power Switching Centers

Load interrupter switchgear
rated at 5-15kV, 600-1200A
for indoor & outdoor use

Bulletin S-3.3.1-3A



PKC switchgear in outdoor enclosure. The modular design offers flexibility for custom systems as well as the expandability to adapt to growing installations.

**ABB Power T&D Company Inc.
Distribution Systems Division**

ABB

ABB type PKC™ Power Switching Centers are reliable, low maintenance and economical load interrupter switchgear assemblies for medium voltage distribution applications such as main switchgear, load center switching and substations. The PKC assembly consists of a number of fused or unfused manually operated load interrupter switches, usually connected along a main bus, and enclosed in a compact indoor or outdoor housing. The PKC is particularly cost-effective in utility, industrial and commercial applications where switching is infrequent, and the absence of quick reclosing and protective relaying functions eliminates the need for more expensive metal-clad switchgear with drawout circuit breakers.

■ All major components of ABB Power Switching Centers, including switches, operating mechanisms, fuses and main bus, are integrated into a single assembly with coordinated ratings matched to specific system requirements. Modular design supports standardized cubicle construction over a variety of possible arrangements for incoming lines, feeders and auxiliary equipment. A key feature of the modular approach to PKC construction is the almost unlimited application flexibility. Standard designs include both free-standing single frame and multi-frame construction. This approach not only provides simple, economical solutions to immediate application requirements, but it also provides easy expandability to meet the changing needs of users well into the future.

■ PKC construction complies with the latest industry standards, including ANSI C37.20.3-1987, *Standard for Metal-Enclosed Interrupter Switchgear*, and IEEE PC37.20.4, *Standard for Indoor AC Medium Voltage Switches for Use in Metal-Enclosed Switchgear*, as well as UL Listing under UL file E146347(M).



Front view of PKC with doors removed (only one fuse in each section for illustration). Safety features abound in PKC construction: personnel screen-type barriers, switch and fuse isolation barriers, and more. Grounded, interlocked full-height doors prevent access to switch compartments while switches are closed. Optional KIRK™ Key arrangements allow interlocking schemes to be coordinated even with remote devices.

■ Ratings

PKC Power Switching Centers are available in a wide range of ratings through 15kV.

Nominal System Rating (kV)	Voltage			Current					Life Expectancy¹		
	Rated Maximum Voltage (kV)	Rated Impulse Bil (kV)	Low Freq Withstand (kV)	Rated Continuous Current (A)	Load Interrupting Current (A)	Momentary Current RMS Asym (kV)	Fault Closing Current RMS Asym (kV)	2-sec Short Time Current Asym (kV)	Switch Fused	No-load Mechanical Endurance	Load Current Endurance
2.4 - 4.16	4.76	60	19	600	600	40	40	25	Fuse Interrupting Rating	500	50
6.9 - 13.8	15.0	95	36	600	600	40	40	25		500	30
2.4 - 4.16	4.76	60	19	1200	1200	61	61	38		500	50
6.9 - 13.8	15.0	95	36	1200	1200	61	61	38		500	30

Note 1 : Operations data provided as guidance for inspection and maintenance.

■ Safety features

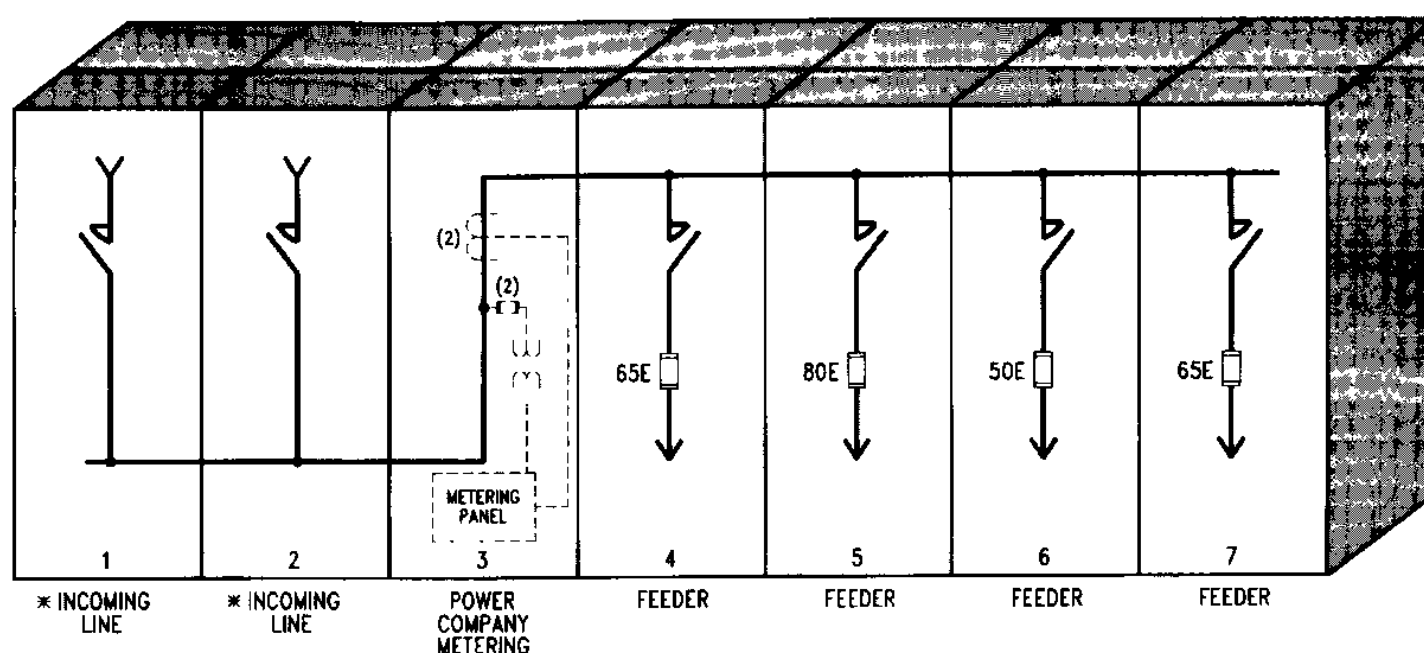
The front door of each switch compartment is mechanically interlocked so that the switch must be in the open position before access to the switch or fuses is possible. The mechanical interlock also assures that the front door must be closed before the switch can be closed. The effect of this interlock feature is to provide a solidly grounded metal barrier to protect operating personnel from the energized bus and switch parts. Meters and instruments are safely isolated from high voltage equipment by a grounded steel barrier. Provisions for user padlocking are also included.

■ Improved maintainability

Downtime is expensive. The PKC is designed for superior reliability as well as quick, convenient inspection and maintenance. The key to system reliability is component selection, and the key to maintainability is accessibility for inspection and repairs. Lexan windows allow observation of switch position and general condition. Interlocked doors provide safe, ready access to switch parts, fuses and fuse clips. The typical time to remove and replace a fuse is measured in seconds! Interrupter switch arc chutes are also easily removed for inspection and maintenance of internal interrupting contacts and interior surfaces.

■ Flexible options to meet specific application requirements

- Control selector switches
- Current and potential transformers
- Metering: *amps, volts, watts, vars, kw-hours, kvar-hours, frequency, power factor, etc*
- Transducers
- Auxiliary switches
- Remote communications equipment
- Station service (control power) transformers
- Lightning arrestors
- Auxiliary frames
- Power Company metering frames
- Insulated bus
- Cable lugs (*clamp or crimp type*), cable supports, or pothead connections
- Space heaters (*standard on outdoor equipment*)
- Thermostats and circuit breakers for heaters (*pull fuses standard*)
- Interior lighting, switches & convenience outlets
- Expulsion type fuses (*only when specified*)



■ From power company metering to commercial & industrial feeders ...

In the typical indoor Power Switching Center arrangement shown above, one or more incoming lines are connected by a main bus to multiple feeder circuits which protect and control various commercial and industrial distribution loads. The typical switchgear lineup is also likely to include utility metering compartments and auxiliary cubicles for other primary-connected equipment such as potential transformers or station service (control power) transformers.

In the above example, redundant utility *incoming lines* enter from overhead distribution and are connected by cable lugs to the three-pole load interrupter switches (unfused) rated at 1200 amps each, which in turn supply power to the main bus.

A *power company metering cubicle* has provisions for mounting potential and current transformers supplied by either ABB or the utility. Metering panels in accordance with utility specifications can also be supplied by ABB.

The *feeder units* in this example consist of fused switches with lug type terminations for bottom entry cable connections. The feeder circuits can also be supplied with current transformers for both local and remote metering.

The main bus is extendable on both ends, so an installation is only as final as the user's plans for expansion.

In the above example, the entire indoor lineup of seven 36-inch wide vertical sections is supplied in a very compact arrangement to minimize floor space and installation costs:

Width: 21 feet
Height: 102 inches
Depth: 64 inches

Outdoor construction adds only nine inches to the height and fourteen inches to the depth of the switchgear (7 inches to both the front and rear for roof overhang).

■ **Reliable, versatile interrupter switches & operating system**

PKC switchgear uses superior quality 3-phase gang operated quick-make, quick-break load interrupter switches, such as the ABB VersaSwitch™ shown below. Each phase consists of main current-carrying blades and interrupting (arcing) blades. Main and arcing blades are hinged on the same side of the switch. As a gang operated switch, main blades for all phases operate simultaneously, and all arcing blades also operate at the same time, in the proper sequence.

Switch live parts include heavy one-piece cast copper alloy contacts and terminals which are silver-plated to conduct heat away from contact surfaces. Main blades are round edge copper bars, and compression springs on the blade members maintain high pressure contact with jaw-type stationary contact castings. With main blades open, interrupting blades are fully visible for inspection and maintenance.

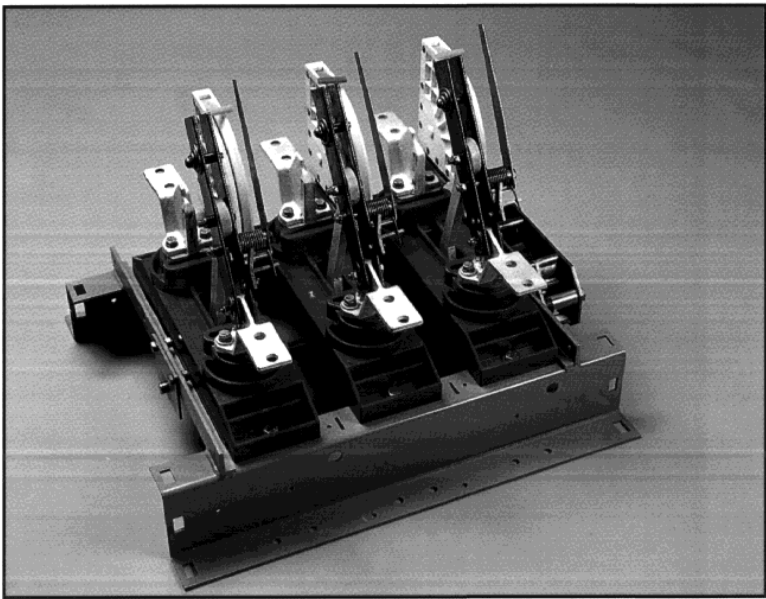
The switch blades are operated through a stored energy spring operating mechanism which provides uniform contact movement and mechanical power for positive action and fault closing, independent of switchgear operator reaction time.

Manual opening and closing are provided through a dependable, easily operated handle system which connects the operating mechanism to the front of the switch enclosure for convenient and safe actuation by the operator.

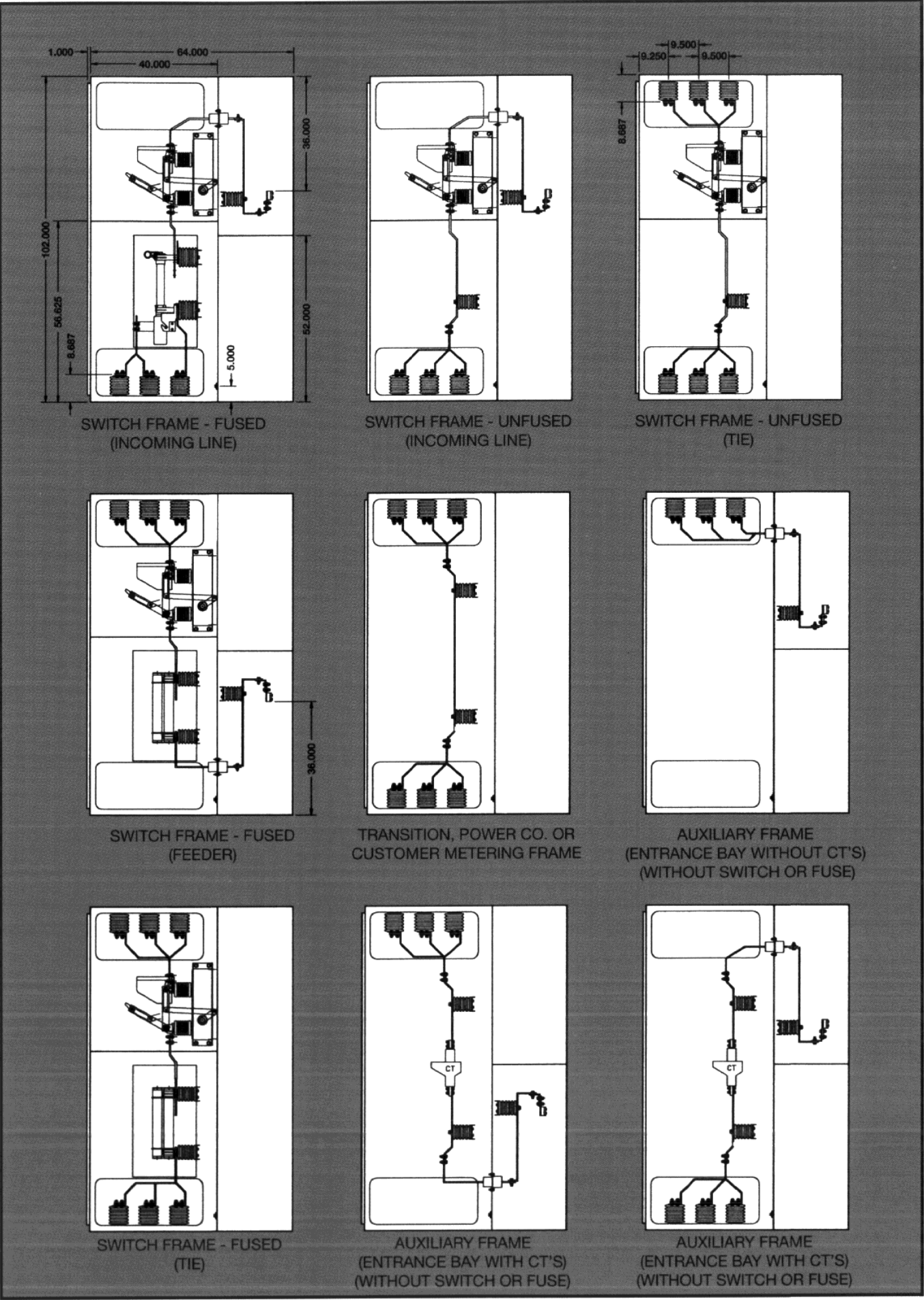
During closing, the main blade closes immediately on release of the closing spring. The arcing blade is held outside the arc area by a flipper sequencing mechanism. When the main blade makes contact with the stationary primary contacts, the sequencing system releases the spring-loaded arc blade to snap to the closed position in a stationary arc chute.

During opening, main blades separate from stationary primary contacts immediately upon release of the opening spring. Spring-biased arcing blades are retained in stationary arc chutes by the sequencing mechanism until main blades move beyond arc striking distance. Arc blades are then released to quickly open and extinguish any arc in a controlled manner within the arc chutes.

VersaSwitch is a manually operated, UL-Listed 600 amp switch with standard glass-polyester insulation and optional porcelain insulation.



- Section views illustrate PKC modular construction which results in flexibility and economy for a wide variety of user applications



Specification Guide *(specifier selections in italics)*

Scope

This specification describes a metal-enclosed load interrupter switchgear assembly consisting of *(fused) (unfused)* interrupter switches and auxiliary devices connected as indicated on the project single line diagram. The assembly consists of one or more units arranged from left to right facing the front of the switchgear. The load interrupter switchgear shall be rated as follows:

Maximum voltage:

(4.76kV, 60kV BIL) (15.0kV, 95kV BIL)

Continuous/interrupting current:

(600/600) (1200/1200) amps

Momentary/short time current:

(40/25kA at 600A) (40/25kA or 61/38kA at 1200A)

The entire switchgear assembly shall be designed and coordinated by the manufacturer to safely withstand the effects of closing on to, carrying and interrupting (when fused) all values of current up to the system ratings specified above. The interrupter switchgear design, testing and construction shall meet or exceed the latest applicable ANSI, IEEE and NEMA standards.

Construction

The load interrupter switchgear shall be designed as *(indoor) (outdoor non-walk-in)* construction, and shall be *(front accessible only) (accessible from the front and rear)*. Each independent frame of the switchgear assembly shall consist of welded and bolted sheet steel construction with full side sheets. Each frame shall be adequately braced, vented and constructed to properly and safely function under normal operating or short circuit conditions. All bus shall be fully rated.

The front of each interrupter switch frame shall be supplied with a full height door interlocked to prevent inadvertent access when the switch is closed. The door shall use a *(mechanical - standard) (KIRK Key - optional)* interlock to assure that the switch operating system is locked in the OPEN position before the door can be opened. The interlock system will also assure that the door is closed before the switch can be closed.

A lexan window shall be provided in the door panel at the front of each interrupter switch to observe the open or closed position of the switch blades. Each door shall also have a provision to accommodate a padlock supplied by the user.

The frame and panel surfaces shall be phosphate treated and painted with an oven-baked corrosion resistant epoxy enamel ANSI 61 light gray finish.

Meters, instruments, auxiliary relays, space heater wiring, and all other low voltage circuits shall be isolated from high voltage components and bus by a grounded steel barrier.

Warning and danger signs shall be affixed to the switchgear by the manufacturer.

The interrupter switchgear assembly shall be tested by the manufacturer in accordance with current ANSI standard production test practices before shipment.

Shipping sections shall be constructed to permit positioning at the jobsite by rolling, bottom lifting, towing or jacking.

Outdoor protection

For outdoor construction, a weatherproof cover shall be provided to protect exposed panel-mounted devices. Exterior surfaces of outdoor switchgear shall receive a coat of oven-baked corrosion resistant acrylic enamel, ANSI 61 light gray finish. Outdoor enclosures shall be weather-proofed, and shall include a sloped roof, space heaters, *(pull fuses - standard) (circuit breakers - optional)* to protect space heater circuits, and wind latches for outer doors.

Load Interrupter Switches

Load interrupter switches shall be three-pole, gang-operated type. All switch compartments *(other than bus tie switches)* shall normally be arranged with the hinge end of the switch on the load side to provide a "dead blade" safety feature. Fuses, when specified, shall be located on the hinge side of the switch. The switch will be equipped with a stored energy, quick-make, quick-break mechanism to operate the switch independent of the speed of the operating handle or other actuation system. Load interrupter switches shall be rated at *(600) (1200)* amps continuous current. (Additional rating information is provided in the PKC rating table on page 3).

Power Fuses

Fuses shall be coordinated to meet the short circuit rating and continuous current ratings as specified in project data sheets or single line diagrams. Each fuse shall have an operation indicator to facilitate identification of blown fuses. Fuses shall be readily accessible and easily removed, and shall be retained in position by high pressure cam-locking devices to prevent slippage or displacement during operation.

Operating Handle

Manual opening and closing of each load interrupter switch shall be provided by a reliable operating handle mounted at a suitable height on the front of the enclosure for convenient and safe actuation by the operator. Switch position and direction of operation shall be indicated.

Specification Guide, continued

Bus System

The main bus shall be three-phase uninsulated bus appropriately sized and braced for the continuous and momentary current ratings of the switchgear. The main bus shall be rated at (600) (1200) amps continuous current, and braced for (40kA momentary/25kA short time) (61kA momentary/38kA short time) currents. The main bus shall not be tapered. Main bus standoff insulators and supports shall be rated for the appropriate system impulse level requirements.

A copper ground bus with a short circuit rating equal to that of the integrated assembly shall be furnished, and shall extend throughout the full length of the switchgear and into each switch compartment. Ground connections readily accessible for customer use shall be provided at each end of the lineup.

Cable Connections

Primary cables shall enter from the (top) (bottom) of each section. Cable terminations shall consist of (NEMA 4-hole drilling patterns on the termination bus) (crimp type lugs) (clamp type lugs) (potheads) for the quantity and size of cables as shown on project data sheets or the single line diagram. (Cable supports shall be provided.)

Secondary (control) wiring shall enter from the (top) (bottom) of each section.

**ABB type PKC™ Power Switching Centers
can be supplied with a full range of innovative, technology-leading
power distribution systems and components from the ABB family of products.**

SafeGear™ arc-resistant metal-clad switchgear

K-Line™ low voltage AC and DC power switchgear

PRICOM Plus™ power communication and control systems

Dry-type, cast coil, liquid filled, and new RESIBLOC™ cast resin power transformers

Sole-sourced, fully integrated Secondary Unit Substations and Power Distribution Centers



**ABB Power T&D Company Inc.
Distribution Systems Division**

Division Headquarters
Switchgear Systems
IEC Products & Systems
After-market Components

Circuit Breaker Operations
OEM Components
KIRK™ Interlock Systems

201 Hickman Drive
Sanford, FL 32771
(407) 323-8220
(407) 322-8934 (FAX)

2300 Mechanicsville Road
Florence, SC 29501
(803) 665-4144
(803) 667-5109 (FAX)

