



Power Plant Electrical Technologies (Pty) Ltd



GIS ZX2 & ZX0.2 SWITCHGEAR

Gas-insulated Medium Voltage Switchgear Manufactured
Under License From ABB Germany

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ABB

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VALUE
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1. INTRODUCTION

This brochure outlines the technical specifications for the PPE Gas-Insulated Switchgear (GIS) solutions, featuring **ABB ZX0.2** and **ZX2** primary core modules and custom PPE Technologies Low Voltage Compartments (LVC). It is intended for qualified personnel handling metal-enclosed, gas-insulated medium voltage switchgear.

2. SAFETY INSTRUCTIONS

- **Arc-Resistant Design:** Familiarize yourself with the pressure relief ducts (top or rear). Never obstruct relief venting paths.
- **Gas Safety:** The primary high-voltage compartments are hermetically sealed under pressure with SF6 or AirPlus™ insulating gas. No gas handling is required on-site under standard conditions.
- **Interlocking:** Strictly adhere to the mechanical and electrical interlocking sequences between the vacuum circuit breaker and the three-position disconnecter before attempting to earth or access cable compartments.

3. GOODS RECEIVING & HANDLING

- **Transportation Guidelines:** GIS panels are heavy (up to 1600kg depending on configuration) with a high center of gravity. Transport upright using certified pallet jacks or forklift trucks.
- **Storage:** Store indoors in a dry, dust-free environment.
- **Packing & Unpacking:** Inspect gas density sensor gauges immediately upon unpacking to verify pressure integrity during transit.

4. PRODUCT OVERVIEW & CHARACTERISTICS

- **Switchgear Characteristics:** Single or double busbar, metal-enclosed, gas-insulated switchboard. Features a fixed-mounted VD4X vacuum circuit breaker, a three-position disconnecter (Connect, Disconnect, Earth), and a sealed-for-life primary compartment protecting against moisture, dust, and vermin.



Figure 2: GIS ZX0.2

5. TECHNICAL SPECIFICATIONS

Parameter	ZX0.2 Core Specifications	ZX2 Core Specifications
Circuit-breaker	VD4X Vacuum Interrupter	VD4X Vacuum Interrupter
Rated voltage [kV]	Up to 36 kV	Up to 40.5 kV
Withstand voltage (1 min) [kV]	Up to 70	Up to 85
Impulse withstand voltage [kV]	Up to 170	Up to 200
Rated frequency [Hz]	50 / 60	50 / 60
Rated normal current [A]	Up to 2500	Up to 3150
Rated short-time withstand current (3s) [kA]	Up to 31.5	Up to 40
Internal Arc Classification (IAC)	AFLR 31.5 kA, 1s	AFLR 40 kA, 1s
Busbar Configuration	Single Busbar	Single & Double Busbar
Insulating Gas	SF6 / AirPlus™	SF6 / AirPlus™
Cable Connection System	Outer-Cone / Inner-Cone	Outer-Cone / Inner-Cone
Protection Degree (Gas Compartments)	IP65	IP65
Protection Degree (LV Compartment)	IP4X	IP4X
Panel Dimensions (Typical)	W: 600/800 mm, H: ~2300 mm	W: 600/840 mm, H: ~2300 mm

Secondary Electrical Parameters: Control circuit wiring (1.5 mm²), current circuit wiring (2.5 mm²). Custom PLC and Relion® protection relay configurations engineered by PPE Technologies.

6. INSTALLATION GUIDELINES

- **6.1 Environment:** Suitable for indoor installation. Can operate in high-altitude environments and areas with extreme humidity/dust due to the IP65 sealed gas tanks.
- **6.2 Cable Compartment & CT Installation:** Access the rear or bottom cable compartment. Install ring-core current transformers (CTs) around the outer-cone or inner-cone cable terminations.
- **6.3 Plug-In Busbar Installation:** Unlike traditional air-insulated copper busbars, GIS busbars utilize a specialized plug-in technology. Clean silicone insulating parts and contact tubes, apply assembly paste, and plug the busbar connectors between adjacent panels. No gas handling or bolting of bare copper is required on-site.
- **6.4 Joining Enclosures:** Align panels precisely, connect the mechanical earthing bars, and link the secondary wiring harnesses across the Low Voltage Compartments.

7. POST-INSTALLATION PROCEDURES

Verify gas density sensor readings. Ensure the mechanical access interlock flaps for emergency manual operation are properly seated. Verify the capacitive voltage indicator systems (e.g., WEGA) are functioning correctly.

8. MAINTENANCE & SAFETY MEASURES

- **Primary Compartment:** Maintenance-free for life. Do not attempt to open the sealed gas tanks.
- **Operating Mechanism:** Visual inspection of the low-voltage operating mechanisms after 5 years or 5,000 operations.
- **PPE Requirements:** Wear appropriate flash protection suits, safety glasses, and electrical safety gloves when racking, switching, or accessing the cable termination compartments.

ASSEMBLY & INSTALLATION PROCEDURES

1. PLUG-IN BUSBAR ASSEMBLY

Unlike traditional air-insulated switchgear that requires manual bolting of bare copper busbars, the GIS range utilizes a dry, plug-in busbar system.

- **System Components:** Each connection consists of a cast-resin busbar socket with embedded silver-plated spiral spring contacts inside the gas tank, a conductive silicone insulating sleeve, and an axially movable copper contact tube.
- **Installation Process:**
 - a. Inspect and clean the cast-resin busbar sockets on the panel sides.
 - b. Evenly coat the silicone insulating sleeve with approved assembly paste (Montagepasta).
 - c. Insert the contact tube and silicone sleeve into the busbar socket.
 - d. Align and push the adjacent panel into place so the contact tube bridges into the neighboring socket.
- **Key Technical Benefit:** The floating contact tube absorbs thermal expansion natively. No site gas evacuation, gas filling, or torque-wrenching of copper joints is required during panel coupling.

2. CABLE TERMINATION SYSTEMS

Outer-Cone Termination System (EN 50181, Type C)

- **Design:** Features gas-tight outer-cone bushings positioned on the lower boundary of the circuit breaker compartment.
- **Cable Connection:** Accommodates standard shockproof T-connectors or elbow-type cable plugs.
- **Configurations:** Supports 1 to 3 cables per phase in 600 mm panels, and up to 6 cables per phase using dual outer-cone bushings in 800 mm or 840 mm wide panels.
- **Current Transformers:** Ring-core current transformers (CTs) fit externally over the outer-cone bushings in atmospheric air, making them easy to install or replace without touching gas seals.

INNER-CONE TERMINATION SYSTEM

(EN 50180 / EN 50181, SIZES 2 & 3)

- **Design:** Gas-tight inner-cone sockets mounted directly in the floor plate of the circuit breaker compartment.
- **Protection:** Delivers 100% metal-enclosed, touch-proof isolation.
- **Testing Features:** Includes integrated, plug-in test sockets. These allow primary current injection, high-voltage cable testing, and cable earthing without dismantling the cable plugs.



Figure 2: GIS ZX2

PANEL TYPES & AVAILABLE GIS UNITS

The lineup includes several specialized panel variants to fulfill all primary distribution substation configurations:

1. Incoming & Outgoing Feeder Panels

- **Function:** Standard distribution panels for power supply and feeder protection.
- **Features:** Equipped with fixed-mounted VD4X vacuum circuit breakers and 3-position disconnectors (Connect / Disconnect / Earth).
- **Widths:** Available in 600 mm, 800 mm, and 840 mm widths depending on current requirements (up to 3150 A).

2. Double Feeder Panels (Ultra-Compact)

- **Function:** Combines two complete, independent feeder circuits into a single physical unit.
- **Features:** Uses a shared 800 mm frame housing two 400 mm feeder sub-compartments.
- **Application:** Designed for space-critical 24 kV networks (up to 630 A feeder current, 25 kA fault rating).

3. Cable Termination Panels

- **Function:** Provides direct cable-to-busbar connection without an integrated circuit breaker.
- **Features:** Includes a 3-position disconnector for safe busbar isolation and earthing.

4. Busbar Sectionaliser Panels (Bus Tie)

- **Function:** Divides a single or double busbar setup into separate operational segments.
- **Options:**
 - **Version 1:** Single-panel sectionaliser where the busbar position shifts from front to rear (or vice versa).
 - **Version 2:** Two-panel configuration consisting of a Sectionaliser Panel (with circuit breaker) and an adjacent Bus Riser Panel.

5. Bus Riser Panels

- **Function:** Works alongside bus sectionaliser or coupler panels to elevate conductors across different busbar levels.

6. Bus Coupler Panels (Double Busbar Systems)

- **Function:** Connects Busbar 1 and Busbar 2 in double busbar lineups, allowing seamless load transfer between busbars.

7. Metering Panels & Integrated Busbar Measurement

- **Dedicated Metering Panel:** A standalone 600 mm wide panel housing isolatable, plug-in voltage transformers or sensors.
- **Integrated Busbar Measurement:** Top-mounted plug-in voltage transformers or sensors fitted directly above the busbar compartment on standard feeder panels, eliminating the need for a dedicated metering panel.



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