



# HV Transmission Solutions

Primary Equipment for a Safe, Reliable & Secure Electrical Grid



with Primary Plus™

Pre-engineered solution set that digitizes XD|GE primary equipment and provides factory installed and configured protection, monitoring, diagnostics and communications.





1000kV Circuit Breaker Segment Gas Insulated Switchgear

## XD|GE Overview

For over a century, utilities around the world have relied on GE products and services to increase power system reliability and improve grid resiliency and responsiveness. As a global leader in grid infrastructure products and services, GE supports a broad set of utility applications ranging from transmission and substation automation to distribution networks and smart metering, enabling greater safety, connectivity and increased security.

Through an alliance with XD Electric®, GE has extended its portfolio to include high and ultra high-voltage power equipment supporting the highest transmission voltage levels in the world. XD Electric is one of China's largest primary equipment manufacturers dedicated to the research, application and development of high and ultra high-voltage power transmission equipment, and has a broad range of products to transform and direct the flow of power for industrial, commercial and residential users.

The XD|GE alliance provides end-to-end transmission solutions to meet the growing demand for electricity globally. The combined portfolios of GE and XD will provide an extensive range of technology solutions for customers in the utility and energy intensive industries.

With a broad portfolio of high-voltage electric transmission systems and proven project executing capabilities, XD|GE can offer one of the industry's most complete lines of high-voltage primary power equipment to monitor and control vital processes that meet the high demand for reliable electricity.

### Exceptional Quality and Reliability

- ANSI® and IEC® certified products available
- Third-party product certifications, including KEMA®, CESI® and other internationally recognized testing facilities
- Multiple checkpoints in the production, assembly and inspection process yield high quality products
- Secondary cross-inspections by certified technicians
- GE quality engineers integrated and co-located at the XD facilities

### Advanced Technology and Manufacturing

- New, state-of-the-art manufacturing facilities
- All manufacturing sites are ISO® 9001 (2002)
- Robust product technology utilized in large GIS installations
- Transformer technology built with advanced 3D platforms provides robust and reliably designed products
- Quality inspections for purchased and outsourced materials enables supply chain excellence



## Key Benefits

- Robust technology platforms and superior reliability with world class primary equipment that extends through the highest voltage ratings
- High quality equipment through dedicated measuring and inspection departments, including full-time professional inspectors for work-in process and finished products
- Reliable system implementation with less rework and downtime through access to global and local power system experts

## Applications

- High-voltage, extra high-voltage (EHV) and ultra high-voltage (UHV) substation equipment and transmission grids
- High-voltage substation equipment for utility distribution grids
- Power plant generator step-up transformers (GSU) and high-voltage switchyard equipment
- High-voltage substation equipment for heavy industrial plants
- Global open air and gas insulated switchgear substations and switchyards

## Primary Plus



XD|GE offers Primary Plus™ on all its primary equipment. Primary Plus is a pre-engineered solution set that provides utilities and large industrial facilities with a means to reduce the time and labor associated with substation construction, expansion and maintenance, while at the same time utilizing technologies and methodologies familiar to existing engineering resources.

XD|GE's factory installed and configured solutions include:

- Digitized primary equipment by replacing labor-intensive, individually terminated copper wires with standardized physical interfaces and open communications protocols (IEC 61850)
- Electrical protection systems optimized for each primary asset and application to monitor and react to fault conditions
- Highly secure and ruggedized communication network equipment including industrial strength wireless, fiber optic multiplexers, and Ethernet switches for an advanced and reliable communications infrastructure

## Proven Project Implementation Expertise

- Extensive experience in utility and industrial power systems studies, high-voltage (HV) substation electrical, civil, structural engineering and design
- Experienced project management professionals who manage the design, procurement, construction, installation, testing, commissioning and training for complete turn-key projects or engineered equipment packages
- Advanced quality management system assures the highest quality throughout all phases of the project lifecycle

## Superior Customer Support

- Rapid response from localized teams providing customer support from quoting to product commissioning and beyond
- Warranty support, technical consulting and parts availability through a global spare parts reserve
- Provisions for remote design reviews and product witnessing at critical manufacturing milestones

# Robust, High Quality and Reliable Technology

Offering a broad range of high-voltage primary equipment supporting power transformers and advanced circuit breaker technology that operates up to 1,100kV, one of the highest transmission voltage levels in the world.

## Transformers



- 69 - 1,100kV rated voltage
- Transformer types: power, auto, reactor, HVDC converter, arc furnace, railway traction and cast coil

## Current and Capacitive Voltage Transformers



- 69 - 550kV SF<sub>6</sub> gas insulated current transformers
- 69 - 1,100kV capacitive voltage transformers

## Gas Insulated Switchgear (GIS & HGIS)



- 72.5 - 800kV rated voltage
- Conventional and hybrid configurations
- High reliability, exceptional environmental and seismic characteristics

## Capacitors



- 25kVAR to 1,000kVAR
- 2,400 Volts to 25,000 Volts. 50Hz and 60Hz
- Internally fused, externally fused, fuseless capacitors and equipment
- Heavy duty designs for increased durability, harmonic/transient tolerance

## High Voltage Circuit Breakers



- 72.5 - 800kV rated voltage
- Unique breaker unit construction minimizes maintenance and inspection

## High Voltage Disconnect Switches



- 72.5 - 800kV rated voltage with superior anti-corrosion properties
- All configurations include double/single break
- Horizontal and vertical designs

## Arrestors and Insulators



- >55kV rated voltage
- ANSI (distribution through station class) and IEC rated arresters
- Solid core post and composite insulators

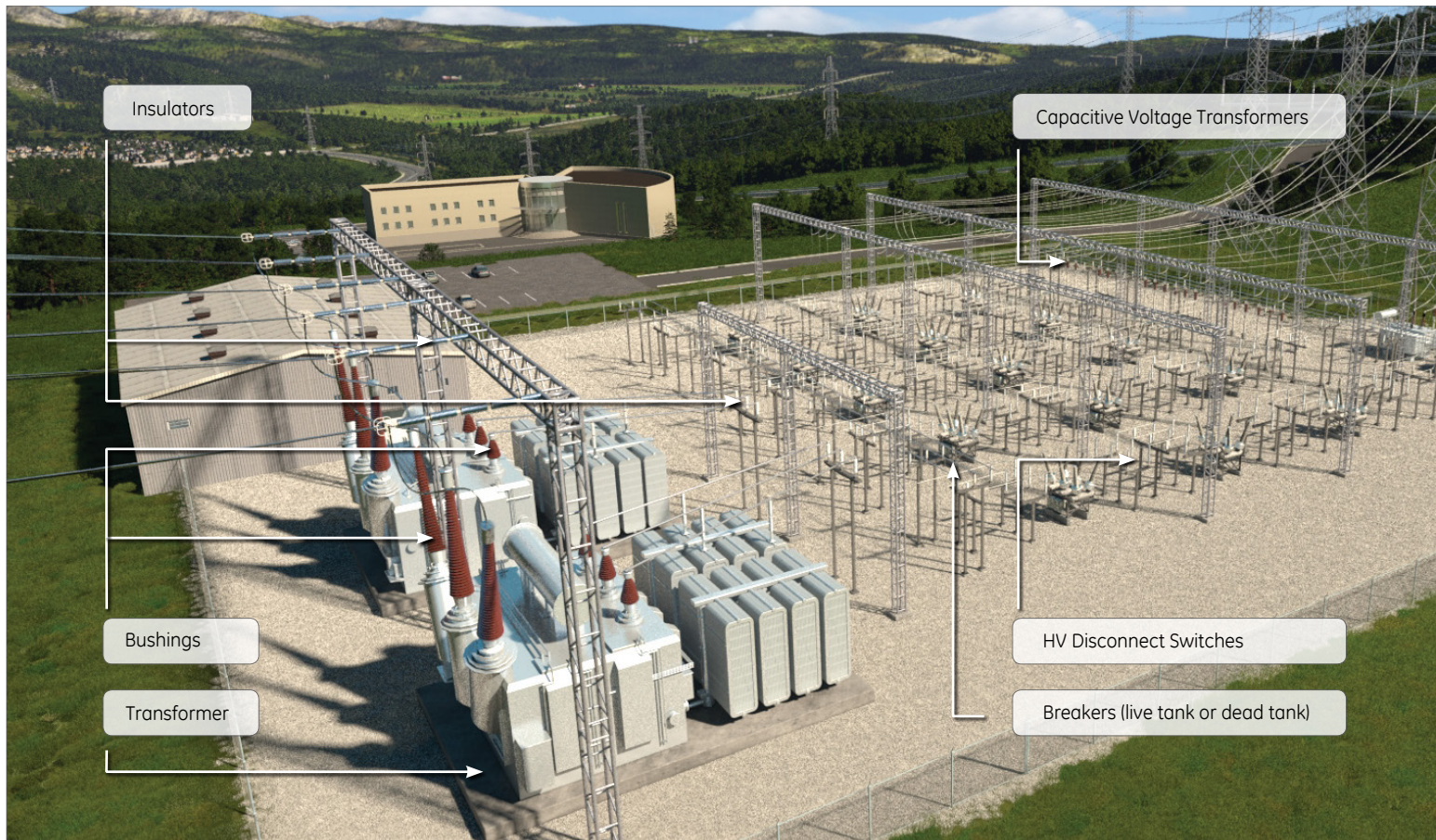
## Exceptional Quality Processes



A focus on quality is an ongoing strategic initiative for XDJGE and is evidenced throughout the manufacturing environment.

From raw materials acquisition and inspection to the finished product, XDJGE's product portfolio is designed to meet rigid quality processes so the installed product provides customers with high reliability.

# Broad Range of HV Transmission Solutions



## Global Project Engineering Services

XD|GE is dedicated to helping its customers reach their system objectives and provides a suite of professional services to assist in the successful deployment and maintenance of XD|GE products and solutions. From design and implementation to post-sales support, a team of technical and business experts are available to help customers effectively use the capabilities and product domain knowledge that are available from XD|GE.

This support infrastructure covers the entire life cycle of the product. From the coordination of transportation logistics to the completion of site acceptance testing and warranty service, the highly qualified XD|GE team is available throughout the implementation.

To ensure a high quality of service to meet the needs of each unique application, XD|GE has a global field service team of highly experienced and dedicated individuals. Coupled with a vast network of high voltage power equipment domain experts, XD|GE is able to support a broad range of applications in various environments.

Finally, XD|GE offers a 24x7 global support service to address and direct any customer application and field questions.

- Logistics management including coordination of ocean and inland transportation
- Installation services include receiving, rigging, unloading and labor (mechanical and electrical)
- Test commissioning
- Site acceptance testing

## Post-Sales and Installation Support

- 24x7 global customer service
- Emergency response hotline
- Several customer support access points available to ensure timely support (telephone, e-mail, fax, or web)
- Global spare parts reserve
- A global network of maintenance and repair facilities

# Primary Plus



## Pre-Engineering Secondary Equipment

Primary Plus, XD|GE's supplemental offering to its primary equipment, is a pre-engineered, factory installed solution set that allows utilities and large industrials to reduce the time and labor associated with substation construction, commissioning, and maintenance. Primary Plus uses technologies and methodologies familiar to existing resources and skill sets.

- Digitized primary equipment for replacing labor-intensive, individually terminated copper wires
- Electrical protection solutions to monitor and react to fault conditions
- Secure and ruggedized communications infrastructure devices including wireless radios, fiber optic multiplexers and Ethernet switches



## Digitized Substation

### Multilin™ HardFiber System

- Using the Multilin HardFiber system, XD|GE can deliver primary equipment with digital communications. The Multilin HardFiber system digitizes analog signals from primary assets utilizing IEC 61850 communications, reducing total life costs of protection and control through labor and resource optimization.
- This factory-installed solution reduces the amount of labor-intensive, individually terminated copper wire connections with pre-terminated copper and fiber optic cables that have standard physical interfaces and supports open digital communications.

### Key Benefits

- Saves up to 50% of Protection & Control labor costs
- Eliminates the majority of copper wiring to better utilize resources for the design, building, commissioning, and maintenance of power system protection and control
- Robust and simple architecture for deploying IEC 61850 process bus
- Improves employee safety by leaving potentially dangerous high-energy signals in the switchyard
- Reduces the chances for operational mistakes made during isolation and restoration after routine maintenance
- Built as an extension of the Multilin Universal Relay (UR) family of products, suitable for a wide array of protection applications
- Rugged, hardened, and secure switchyard interface enabling NERC/CIP compliance



## Electrical Protection & Control

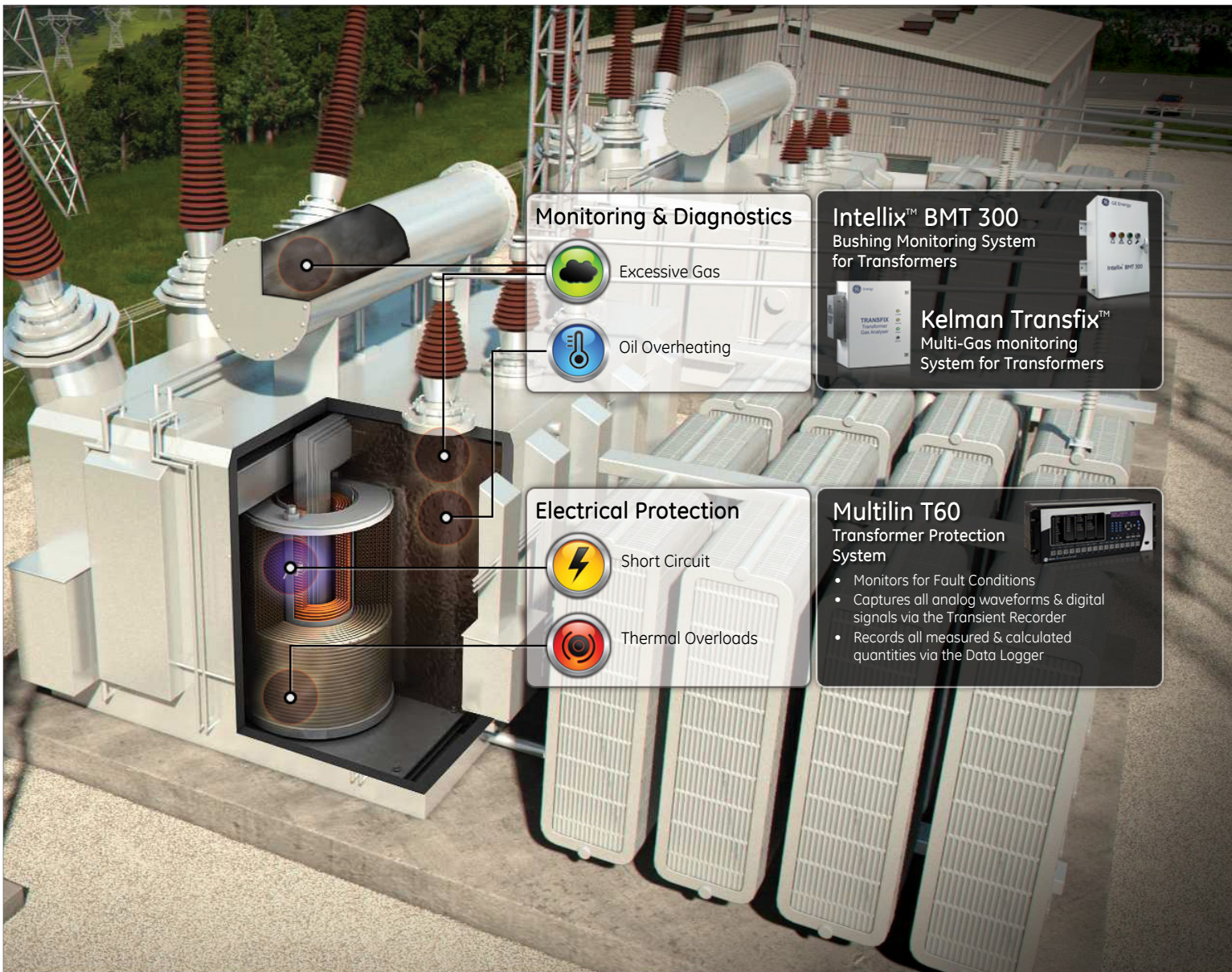
### Advanced Relays for Substation Equipment

Primary Plus uses substation hardened Multilin protection and control relays to provide comprehensive protection, control, automation, and monitoring of primary substation equipment. With fast deterministic execution of programmable automation logic, extensive I/O options, and integrated high-speed peer-to-peer communications, Multilin protection devices ensure optimized asset performance for maximum power system availability.

### Key Benefits

- Common, modular platform to meet unique application design requirements
- Advanced automation, I/O expandability, and programming logic for customized protection & control solutions
- High accuracy fault and disturbance recording for improved post event analysis
- High speed communications and inter-relay connectivity, including support for IEEE 1588 for reduced wiring and installation costs
- CyberSentry™ provides high-end cyber security (NERC CIP, AAA, Radius, RBAC, Syslog)
- Integrated monitoring and metering for reliable asset management and maintenance optimization
- Embedded IEC 61850 protocol support, eliminating the need for external communications hardware relay operating signals







**Monitoring & Diagnostics**

-  Excessive Gas
-  Oil Overheating

**Electrical Protection**

-  Short Circuit
-  Thermal Overloads

**Intellix™ BMT 300**

Bushing Monitoring System for Transformers



**Kelman Transfix™**  
Multi-Gas monitoring System for Transformers

**Multilin T60**

Transformer Protection System

- Monitors for Fault Conditions
- Captures all analog waveforms & digital signals via the Transient Recorder
- Records all measured & calculated quantities via the Data Logger

**Monitoring & Diagnostics**

**Monitor & Proactively Manage Transformers**

GE offers a wide range of solutions that monitor, manage, detect and diagnose transformer issues to optimize substation assets. Online monitoring of transformer oil with composite gas or multiple gas Dissolved Gas Analysis (DGA), allows asset owners to be notified of developing conditions that could lead to unscheduled outages. Our advanced prognostics, maintenance services, and proven modeling capture and analyze critical transformer data.

**Key Benefits**

- Minimizes costly unplanned outages and equipment failure by predicting faults up to 6 months in advance
- Optimize transformer output, maximizing assets
- Calculate transformer aging
- Remote 24x7 asset monitoring for online anomaly detection & trending
- Eliminate costly consumables and calibration gases with photo acoustic technology





## Grid Solutions

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