



# IEC Oil Filled & SF<sub>6</sub> Gas Current Transformers

72.5kV - 550kV (325kV - 1550kV BIL)

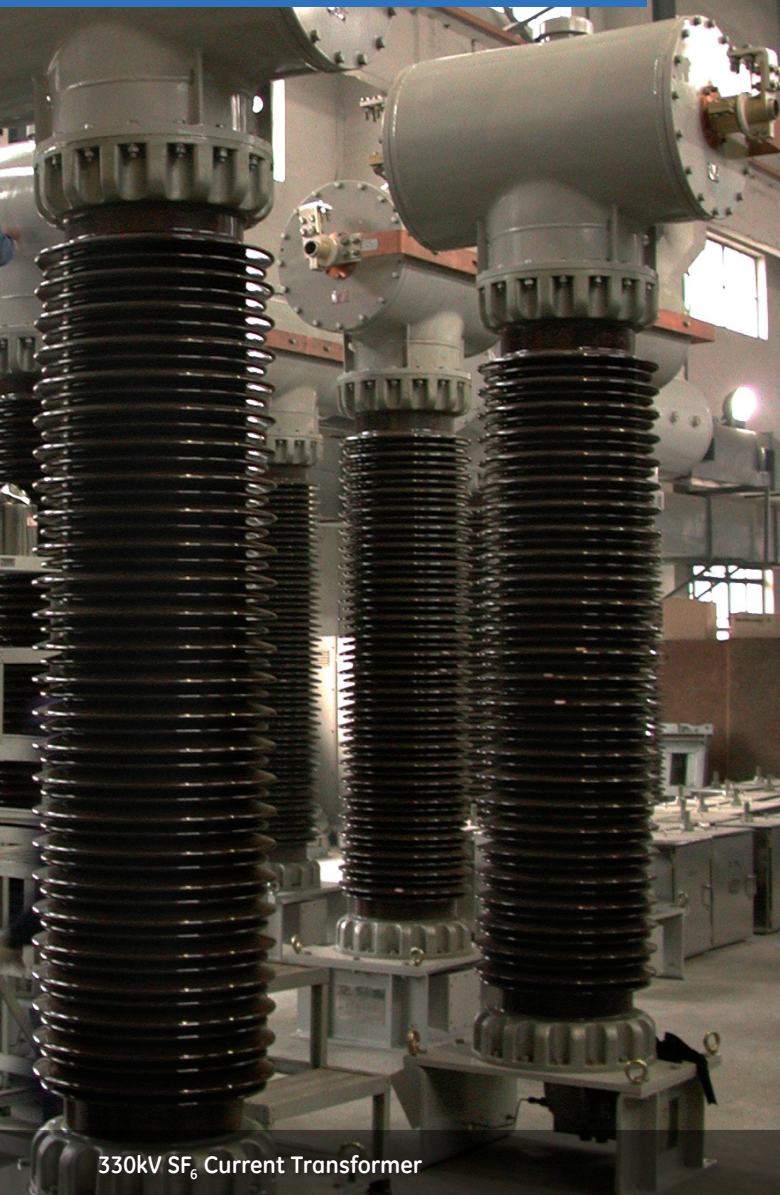


with **Primary Plus™**

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



GE  
Digital Energy



330kV SF<sub>6</sub> Current Transformer



500kV SF<sub>6</sub> Current Transformer

## XD|GE: Collaborating to Deliver High Voltage Solutions

For over a century, utilities around the world have relied on GE to deliver products and services that increase power system reliability, 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 critical transmission equipment and solutions. XD Electric 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 global demand for electricity. The combined portfolios of GE and XD provide a comprehensive range of technology solutions to address the unique challenges faced by the utility sector and energy intensive industries.

### Instrument Transformers

XD|GE's suite of Instrument Transformers provide high accuracy measurement of voltages and currents for the effective operation and management of transmission & distribution systems.

With a broad range of instrument transformer solutions and in-field experience spanning more than a quarter century, XD|GE is an industry leader providing



## Key Features & Benefits

- Applications from 72.5kV – 550kV
- Standard and high accuracy units
- Meets applicable IEC and IEEE/ANSI metering and protection standards
- Lower partial discharge due to uniform internal electric field distribution
- Lower dielectric loss in long term operation
- Transient protective winding available for high power system and reclosing operation.
- High seismic withstand units available
- Standard creepage distance exceeds IEEE and IEC requirements
- Extra creepage units are available upon request
- Oil and SF<sub>6</sub> gas insulated designs
- Suitable for low and high temperature applications
- Specialty metering and relaying cores available upon request
- Quality Assurance in accordance with ISO 9001

## Primary Plus



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

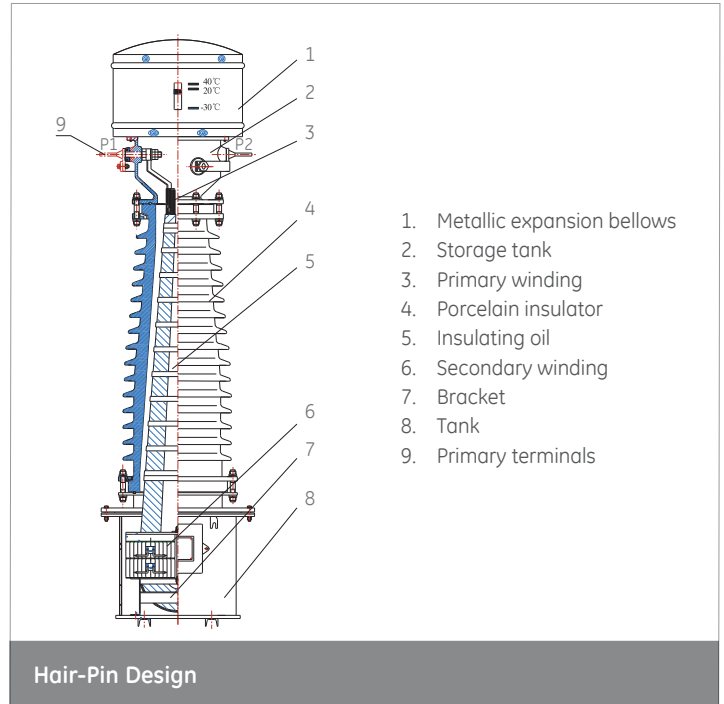
XD|GE's factory installed and configured solutions include:

- Digitized primary equipment by replacing labor-intensive, individually terminated copper wires with standardized physical interfaces and open digital communications
- Electrical protection systems optimized for the equipment 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

high quality, innovative, and reliable products. Its portfolio provides standards to high accuracy solutions suitable for revenue metering and system protection applications and includes Current Transformers (CT's), Capacitive Voltage Transformers (CVT) and Capacitance Coupled Voltage Transformers (CCVT). With this comprehensive range of accurate power sensing devices coupled with GE's vertical integration approach and skilled design engineering staff, we work closely with our global customers to provide the right solution for each unique application.

The XD|GE instrument transformers facilities are ISO® qualified and follow strict quality control measures and processes to ensure reliability and maximum operational life.

# Structure and Dimension



## Schematic Oil Filled Current Transformer

### Hair-Pin Design

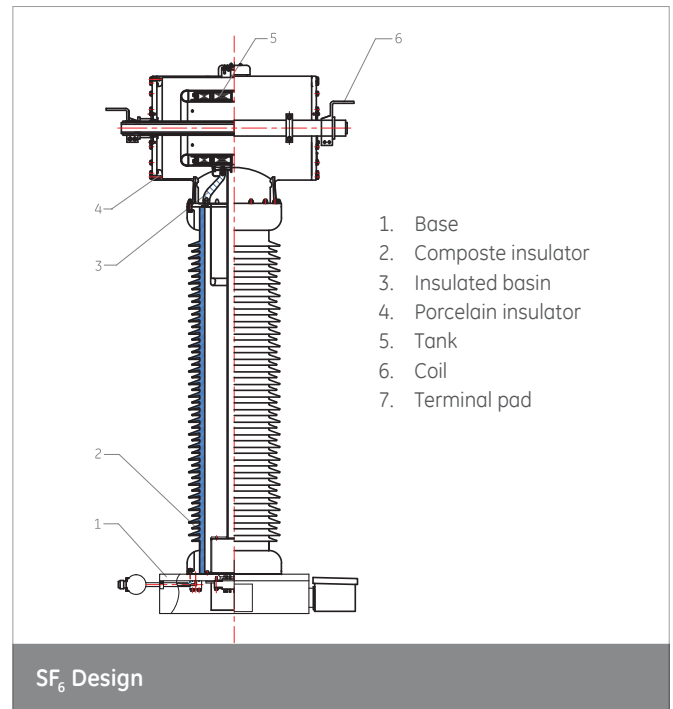
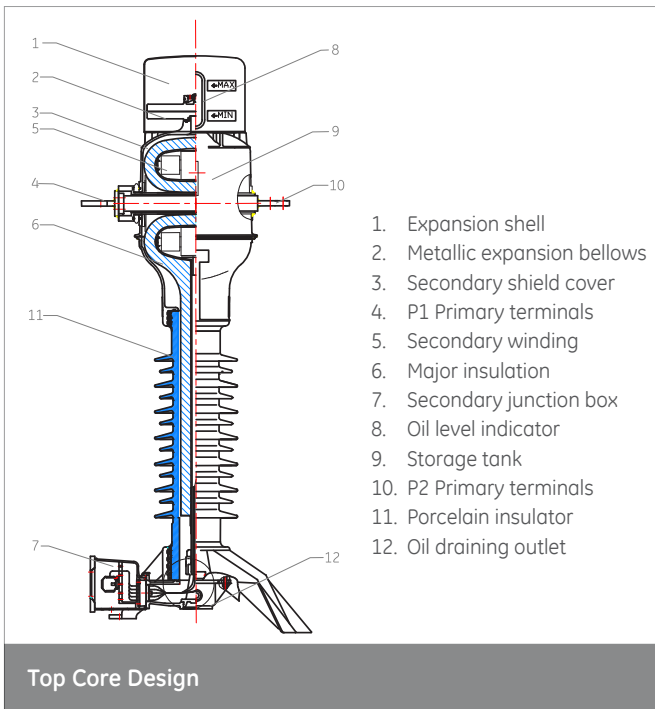
### Current Transformers

The oil filled LB "hair-pin" design consists of 1 to 6 U-shaped primary turns insulated with capacitance graded oil-paper insulation and housed in a porcelain housing. The secondary cores are contained in the bottom tank which is at ground potential.

The oil filled LVB "top core" design consists of a re-connectable primary in the top tank of the CT with one to six secondary cores depending on the current level & performance requirements. The top tank is at primary voltage. Both oil filled designs utilize stainless steel expansion bellows.

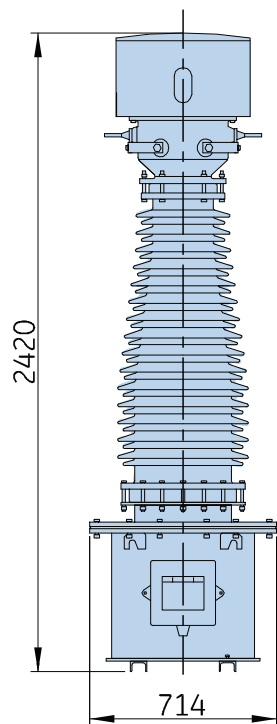
The SF<sub>6</sub> gas insulated "top core" design utilizes SF<sub>6</sub> gas for its insulating medium and eliminates the need for measuring partial discharge associated with oil-paper insulation systems. A fast acting pressure relief device minimizes internal pressures during faults. SF<sub>6</sub> CT's are available with porcelain or silicone rubber composite bushings.

Structure and Dimension — Oil Filled and SF<sub>6</sub>

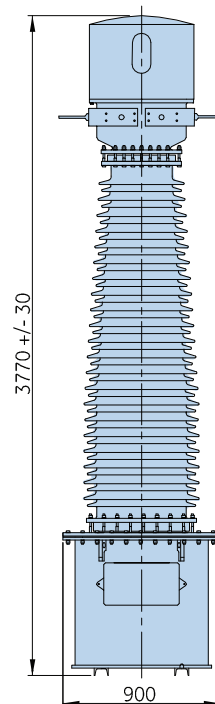


Outline Drawings: Oil Filled - Hair-Pin Design

Model: LB Typical 72.5kV & 126kV CT



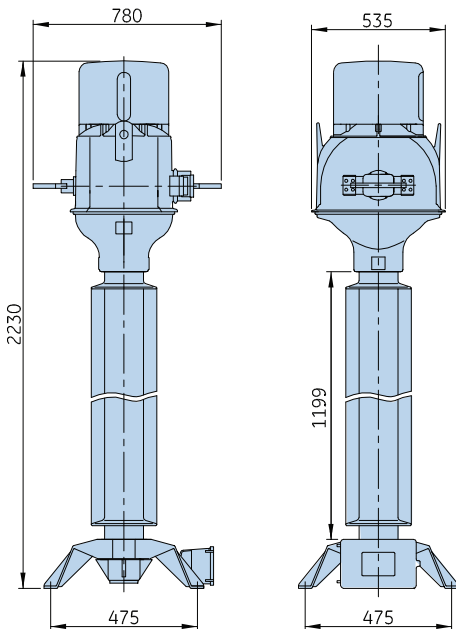
Model: LB Typical 252kV CT



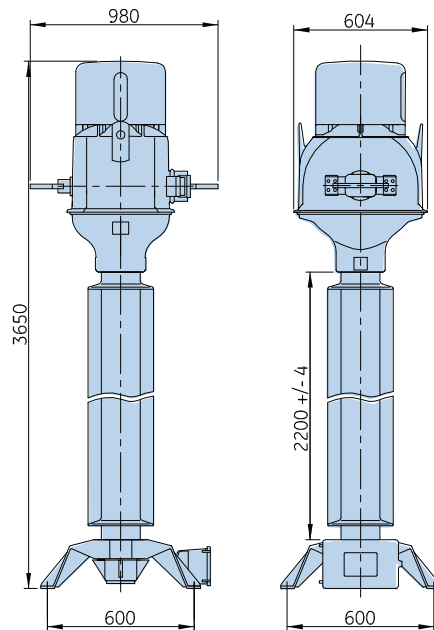
## Structure and Dimension — Oil Filled

### Top-Core

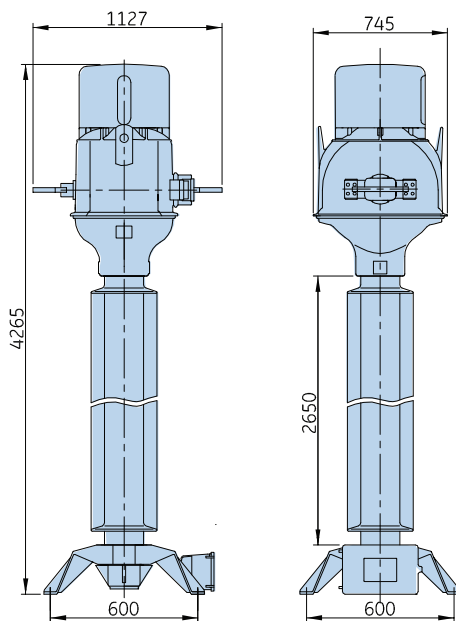
Model LVB — Typical 72.5kV - 126kV CT



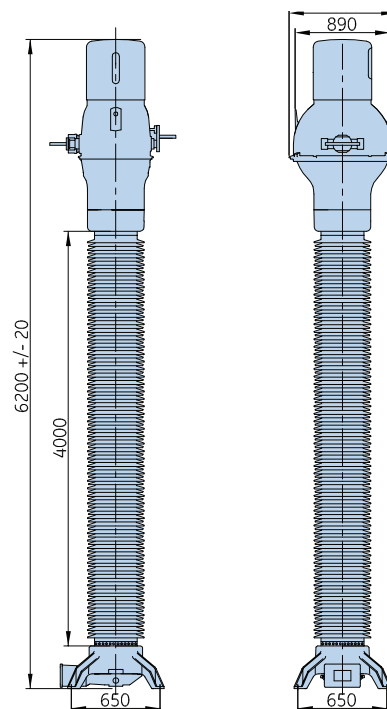
Model LVB — Typical 252kV CT

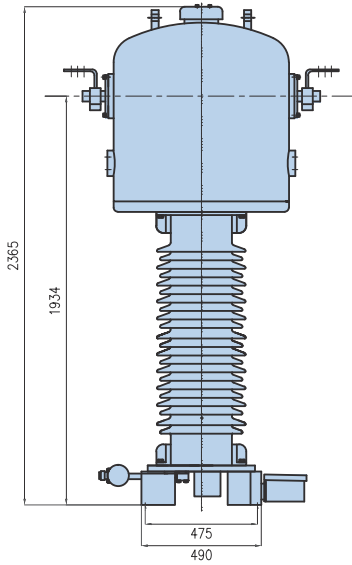
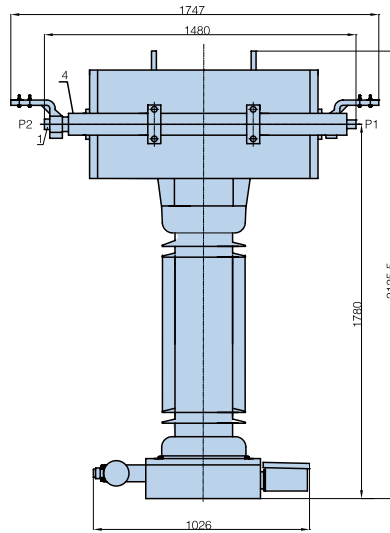
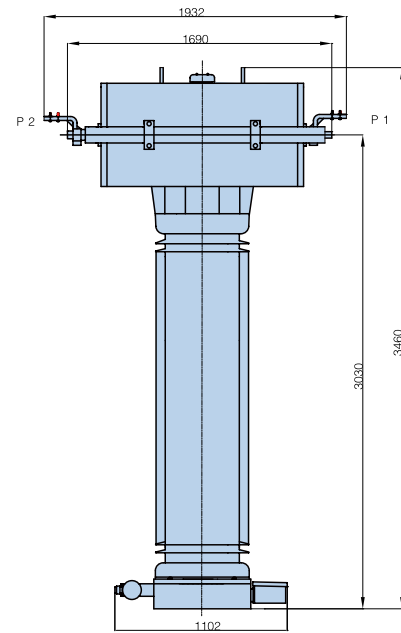


Model LVB — Typical 363kV CT

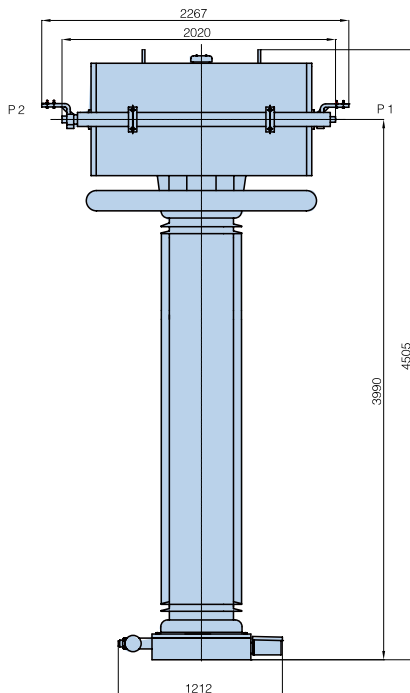


Model LVB — Typical 550kV CT

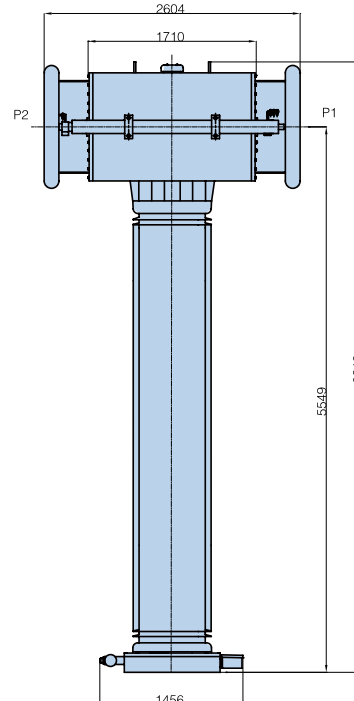


Structure and Dimension — SF<sub>6</sub> GasModel LVQBT –  
Typical 72.5kV CTModel LVQB –  
Typical 126kV CTModel LVQB –  
Typical 145kV-252kV CT

Model LVQBT – Typical 363kV CT



Model LVQBT – Typical 550kV CT



# State-of-Art Facilities and Rigorous Quality Processes

XD|GE's technology portfolio is built in state-of-the-art manufacturing and testing facilities with robust quality processes which provide customers with products that meet the critical and demanding reliability and environmental challenges of transmission applications.

## Manufacturing Excellence

XD|GE designs a broad range of instrument transformers in two specialized production facilities including machining, surface treatment, insulating, windings and housings. One facility is dedicated to the production of oil CTs and CVTs and the SF<sub>6</sub> CT's are manufactured within the GIS facility.

The components and final assembly are manufactured by XD|GE through a completely integrated manufacturing model to ensure quality and supply chain integrity.

The instrument transformers facilities are ISO® 9001 certified, ISO 14001 certified for environmental management systems, as well as OSHA® 18001 certified for health and safety management systems.

## Exceptional Quality

A focus on quality is an ongoing strategic initiative for XD|GE and that is evident throughout the manufacturing environment. The quality process begins with an incoming inspection of all materials to ensure the best possible inputs before manufacturing begins.

Throughout the production and assembly process, there are multiple checkpoints, including both visual inspections as well as stopped flow inspections, all performed to documented test plans. The production facilities follow strict non-conforming procedures to identify, control and avoid the use and delivery of non-conforming products. Each production facility has developed strict environmental standards, including controls of cleanliness, temperature and humidity, and has controls in place to monitor and manage to the established standards.

In addition, XD|GE has a dedicated measurement and inspection department with a certified full time inspector in each of its manufacturing sites. The measurement and inspection department provides a secondary cross-inspection for all work in process, as well as finished products, ensuring a high level of quality is achieved throughout the manufacturing process. First Pass Yield and Cost of Quality data is maintained and analyzed, per product family, in order to drive continual product and process improvements and higher product reliability.

From raw materials acquisition and inspection to finished product, XD|GE's instrument transformers are designed to meet rigid quality processes so the installed product provides the highest level of reliability.

## Advanced Test Facilities

XIHARI®, the Xi'an High Voltage Apparatus Research Institute, is an integral part of the XD|GE alliance. XIHARI has extensive testing capabilities at its facility sites, which include a: High Power Laboratory, High Voltage Laboratory, Artificial Climate Laboratory, EMC Laboratory, and an Operational Test Circuit for HVDC Thyristor Valves.

The testing hall meets all of the requirements of ISO/IEC 17025 and houses some of the largest test equipment in the world, providing the capacity to test primary equipment as large as 1,100kV AC. The High Voltage Apparatus Laboratory in XIHARI is a government authorized national high-voltage apparatus quality supervision and inspection test center. It is an independent third-party laboratory for type tests, routine tests, performance tests and certificate tests for high-voltage apparatus. The testing facilities at XIHARI also include an extension environmental laboratory. Testing capabilities here include high altitude testing, high humidity testing, and temperature testing from -70° C up to +150° C.





# Support and Service

## 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.

### Specialized Installation and Commissioning

- 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



4800kV/720 kJ Impulse Voltage Generator & ±2000kV 30mA DC Voltage Generator

## Primary Plus



### Pre-Engineered Secondary Equipment

Primary Plus, XD|GE's supplemental offering to its primary equipment, is a pre-engineered, factory installed solution set that allows utilities to reduce the time and labor associated with substation construction and commissioning. 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 with standard physical interfaces and 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 Primary Substation Equipment

Primary Plus utilizes the Multilin C60 Breaker Protection system or Multilin F60 Feeder Protection system to provide primary protection of critical substation equipment. Multilin relays are substation hardened devices that provide comprehensive protection, control, automation, and monitoring of high voltage substation circuit breakers. With fast, deterministic execution of programmable automation logic, extensive I/O options, and integrated high-speed peer-to-peer communications, Multilin protection devices can receive and execute commands and at a fraction of the cost when compared to a traditional hard-wired configuration.

#### Key Benefits

- Advanced circuit breaker monitoring and control in a single platform
- Complete IEC 61850 Process Bus solution providing resource optimization and minimizing total protection & control lifecycle costs
- Modular hardware architecture allow for device configuration flexibility, meeting the needs of most circuit breaker applications
- Advanced fault and disturbance recording, including internal device health monitoring, eliminating the need for external devices and maximizing asset life
- Robust network security enabling critical infrastructure Protection and NERC/CIP compliance
- Advanced automation capabilities for customized protection and control systems
- Simplified system integration and access to information through the use of multiple communication options and protocols, including native support for IEC 61850



# Technical Specifications

## 72.5kV—126kV Current Transformers

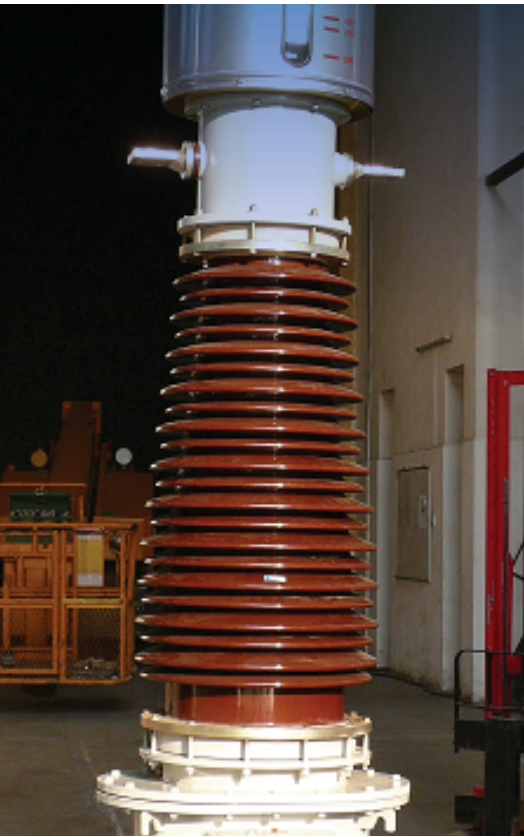
Insulation	Oil	Oil	SF <sub>6</sub>	Oil	Oil	SF <sub>6</sub>
Design type	Top core	Hair-pin	Top Core	Top Core	Hair-pin	Top core
Type	LVB-72.5	LB-72.5	LVBQT-72.5	LVB-126	LB-126	LVQB-126
Rated frequency Hz (60Hz available on request)	50	50	50	50	50	50
BIL <sub>1.2/50μs</sub> fullwave (kV)	350	350	325	550	550	550
Power Frequency Withstand Voltage (kV)	160	160	155	230	230	230
Creepage distance (mm)	2248	1813	3150	3906	3150	3906
Rated primary current (A)	Up to 4000	Up to 2500	up to 4000	up to 4000	up to 2500	up to 4000
Rated secondary current (A)	1/5	1/5	1/5	1/5	1/5	1/5
Accuracy class (upon request)	0.15S Metering + 3 relaying cores	0.15S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores
Rated Output (VA)	10-50	10-50	10-50	10-50	10-50	10-50
Rated short-time current/3s (max) I <sub>th</sub> (kA)	50	40	40	50	40	40
Rated dynamic current (max) I <sub>dyn</sub> (kA)	125	100	100	125	100	100
Dimensions (L x W x H)(mm)	930*604*2370	714*560*2420	2365*1200*1000	930*604*2370	714*560*2420	2125 *1480*600
Rated SF <sub>6</sub> gas pressure (at 20 deg C) (Mpa)	n/a	n/a	0.4	n/a	n/a	0.4

## 145kV—252kV Current Transformers

Insulation	Oil	Oil	SF <sub>6</sub>	Oil	Oil	SF <sub>6</sub>
Design type	Top core	Hair-pin	Top Core	Top core	Hair-pin	Top core
Type	LVB-145	LB-145	LVQB-145	LVB-252	LB-252	LVQB-252
Rated frequency Hz (60Hz available on request)	50	50	50	50	50	50
BIL <sub>1.2/50μs</sub> fullwave (kV)	650	650	650	050	1050	1050
Power Frequency withstand voltage (kV)	275	275	275	460	460	460
Creepage distance (mm)	4495	4495	4495	7812	6300	6300 (7812)
Rated primary current A	up to 3000	up to 2500	up to 2500	up to 4000	up to 2500	up to 4000
Rated secondary current A	1/5	1/5	1/5	1/5	1/5	1/5
Accuracy class (upon request)	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores
Rated Output (VA)	10- 50	10- 50	10- 50	10-50	10-60	10-60
Rated short-time current/3s (max) I <sub>th</sub> kA	50	40	40	63	50	50
Rated dynamic current (max) I <sub>dyn</sub> kA	125	100	100	160	125	125
Dimensions (L x W x H)	774*600*2734	774*600*2734	2425*1480*600	604*980*3650	900*780*3770	3460*1600*800
Rated SF <sub>6</sub> gas pressure (at 20 deg C) (Mpa)	n/a	n/a	0.4	n/a	n/a	0.4

## 363kV- 550kV Current Transformers

Insulation	Oil	SF <sub>6</sub>	Oil	SF <sub>6</sub>
Design type	Top core	Top core	Top core	Top core
Type	LVB-363	LVQBT-363	LVB-550	LVQBT-550
Rated frequency Hz	50	50	50	50
BIL <sub>1.2/50μs</sub> fullwavekV	1175	1300	1175	1675
Power Frequency withstand voltage (kV)	510	510	680	740
Creepage distance (mm)	11253	11253	13750	13750
Rated primary current A	up to 4000	up to 4000	up to 4000	up to 4000
Rated secondary current A	1/5	1/5	1/5	1/5
Accuracy class (upon request)	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores	0.5/0.2/0.2S Metering + 3 relaying cores + 4 TPY	0.5/0.2/0.2S Metering + 3 relaying cores + 4 TPY
Rated Output (VA)	10-50	30-60	10- 50	10- 50
Rated short-time current/3s (max) I <sub>th</sub> kA	63	63	63	63
Rated dynamic current (max) I <sub>dyn</sub> kA	160	160	160	160
Dimensions (L x W x H)	745*1127*4265	4660*2100*1000	1000*1200*6200	6230*2610*1400
Rated SF <sub>6</sub> gas pressure (at 20 deg C) (Mpa)	n/a	0.5	n/a	0.5



## Digital Energy

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