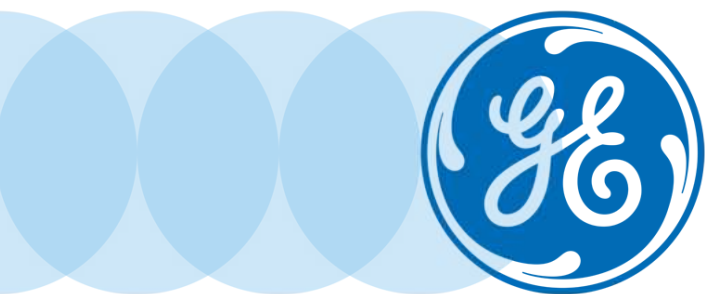


GE
Grid Solutions

Disconnectors



Flexible and Reliable Layout Configurations up to 1,200 kV



WHO WE ARE

Grid Solutions, a division of GE Energy Connections, is a global leader in providing solutions that modernize the grid - managing and moving power from the power plant to the consumer.

For over 100+ years, Grid Solutions has led in the development, design, manufacturing and installation of a broad range of integrated hardware and software solutions for utilities and energy intensive power users including oil and gas, petrochemical, mining, metals, water, critical infrastructure and telecommunication companies.

Built on interpolatable designs, industry standards and deep domain knowledge, Grid Solutions products help to maximize the efficiency, reliability and security of our customer's electrical infrastructures. From protecting and optimizing assets such as generators, transmission lines and motors, to delivering analytic tools to help manage the power grid, Grid Solutions delivers industry leading technologies to solve the unique challenges of each customer.





Why a Disconnecter?

Taking economic savings to an extreme, some companies choose to reduce their safety equipment. For over 100 years, the visible gap provided by disconnectors (or disconnect switches) has made the difference between life and death - not having them is a risk simply not worth taking.

Disconnectors are built in a variety of physical forms. Based on the substation configuration, different designs are available according to overhead and interphase clearances. When necessary, space saving configurations can be taken into account in your design by, for example, using pantograph and semi-pantograph disconnectors instead of horizontal isolators.

Outdoor disconnectors are an essential element of electrical power transmission systems. As breakers divert loads and protect all the other equipment, instrument transformers ensure current metering as well as information flow.

Disconnectors ensure the safety of the people working on the high voltage network, providing visible and reliable air gap isolation of line sections and equipment.

Our Basic Design Principles

Proven protection against surges (insulation co-ordination)

Interlocking system reliability

Signalization system reliability

Safe on-site installation of each component

Reliable mastering of normal and exceptional stresses

Reduced maintenance

Environmentally compatible technology and materials

Cost effective designs and production techniques

Adaptable and flexible products for customized design requirements

Disconnectors ensure the safety of people working on the high voltage network

GE is the world's leading manufacturer of disconnectors

Global Leader in Disconnectors

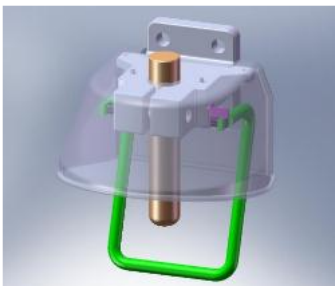
Extensive Portfolio and Installed Base

GE is a global leader for disconnectors (disconnect switches) since the 1960s, with 8 production facilities and 500,000+ installed poles in more than 130 countries around the world. The extensive portfolio includes disconnectors for AC applications up to 1,200 kV, for DC applications up to 1,000 kV and for railway applications.

GE disconnectors have proven their reliability in the torrid climates of Arizona (USA), Australia and Sudan and in the extremely cold territories of Canada, Russia and Sweden, in the tropical weather conditions of Panama, Indonesia, Malaysia and Venezuela and in regions with intense seismic activities such as Chile and California (USA).

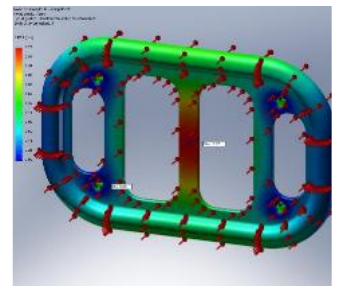


Efficient Design Department and Innovative Products



High performance and innovative products are essential to the existence and growth of our company and yours, and are the prime result of our research and development projects.

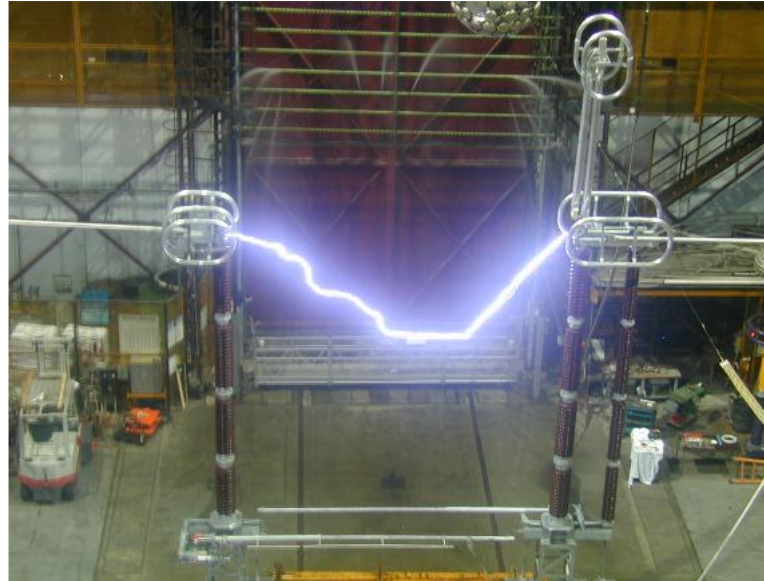
Highly experienced GE engineers and technicians use modern design tools such as 3D computer-aided design (CAD) and electric/magnetic field analysis software. Considerable investments have been made in the design and development of new, more cost efficient products. Highly experienced teams of engineers constantly contribute to the continuous development of GE disconnectors.



Research and Development

Quality Orientated Facilities

To remain the world's largest manufacturer of disconnectors means constantly improving our technologies. Our modern production facilities in Europe, the Americas and Asia are always seeking newer and more efficient organizational structures. GE facilities were developed to grow with the requirements of evolving technologies in order to perfectly manage the quality of components and the essential elements of disconnectors.



Customer Benefits

- High safety and reliability
- Top performance
- Certified quality according to ISO 9001 and ISO 14001
- Minimal maintenance
- Global service teams
- Easy installation and commissioning



Applications and Performance



CENTER BREAK

In the center break design, the two arms rotate and the disconnecter opens in the center. It is the most commonly used disconnecter and offers ratings up to 550 kV. The center break requires an increased interphase distance.

Ratings

Voltage	40.5 kV to 550 kV
Nominal current	up to 6,000 A
Short circuit	up to 80 kA, 1 s



V TYPE CENTER BREAK

The V type center break has two moving insulators mounted on a small common base. It can be mounted on simplified and cost-effective supporting structures. Available up to 145 kV.

Ratings

Voltage	72.5 kV to 145 kV
Nominal current	up to 2,000 A
Short circuit	up to 50 kA, 5 s



EARTHING SWITCHES

Earthing switches are used to connect to ground sections of a substation or HV line to ensure personnel safety. They can be combined with any disconnecter type or installed independently with their own insulator.

Ratings

Voltage	40.5 kV to 800 kV
Short circuit	up to 80 kA, 3 s



DOUBLE SIDE BREAK

The double side break design features three insulators. The end insulators are fixed while the center one pivots and provides two breaks in series. Contrary to the other two horizontal break designs, it requires a minimal interphase distance and allows higher loads on high voltage terminals.

Ratings

Voltage	40.5 kV to 550 kV
Nominal current	up to 5,000 A
Short circuit	up to 63 kA, 3 s



VERTICAL BREAK

The vertical break also has two fixed and one moving insulator. It requires a minimal interphase distance.

Ratings

Voltage	24 kV to 800 kV
Nominal current	up to 4,000 A
Short circuit	up to 80 kA, 3 s

Pantograph and Semi-Pantograph Solutions



PANTOGRAPH and SEMI-PANTOGRAPH

Both disconnector types feature one fixed and one rotating insulator and are usually used to connect the two busbars of double decker substations. Placed diagonally to the axis of the busbars and feeder, they offer a very clear - and therefore safe - arrangement and space saving solution.

Ratings

Voltage	72 kV to 1,000 kV
Nominal current	up to 4,000 A
Short circuit	up to 80 kA, 1 s

Ratings

Voltage	123 kV to 1,000 kV
Nominal current	up to 5,000 A
Short circuit	up to 80 kA, 3 s

KNEE TYPE

The knee type has two fixed and one moving insulator and requires limited overhead clearance thanks to its folding-arm design.

Ratings

Voltage	245 kV to 1,200 kV
Nominal current	up to 4,000 A
Short circuit	up to 63 kA, 3 s

Special ratings are also available to meet specific customer needs



Heavy Duty Solutions

GE also offers solutions to interrupt induced currents with ground switches. These currents occur when an earthed line runs parallel to a live line. GE manufactures various models of earthing switches which meet IEC 622-71-102 class A or B and for inductive current values of up to 525 A at 70 kV.



Standards & Environmental Conditions

GE has developed products that meet international IEC and IEEE standards, as well as GB Chinese national standards. GE's range of disconnectors can be adapted to meet almost any specific customer requirement for virtually all environmental conditions.

- Temperatures from -55°C to + 55°C
- Ice breaking capacity up to 42 mm
- Pollution levels from low to very high
- Seismic withstand capability up to 1.0 g
- Altitudes above 1,000 meters require de-rating

Interrupting Capabilities

The constant evolution of power system characteristics increasingly challenges the interrupting capacities of disconnectors. GE offers innovative solutions for the following disconnector applications:

Transformer magnetizing current interruption:

- Arcing horns
- Whips

Busbar switching contacts (up to 1600 A, 300 V) Line and cable charging currents switching:

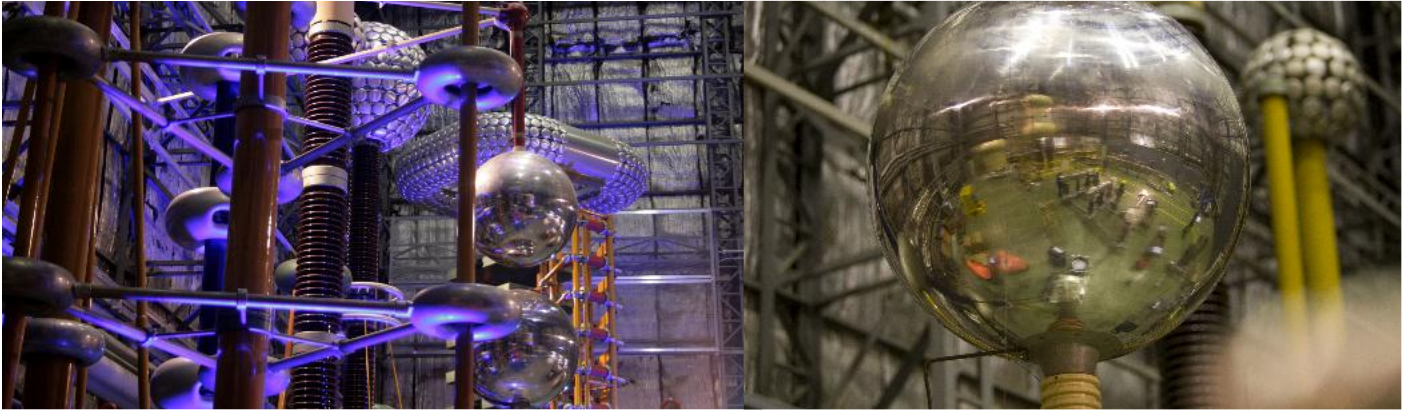
- Whips
- SF₆ interrupters

Load breaking:

- SF₆ or vacuum interrupter



Type Testing Facilities



All GE disconnector manufacturing sites are ISO 9001 and ISO 14001 certified. GE has a clear environmental policy and the management believes that sustainable development of the company must be achieved in harmony with the environment and natural resources.

Type Testing Facilities

The GE disconnector competence center located in Noventa di Piave near Venice, Italy, is equipped with its own high performance testing facility.

The high voltage test laboratory, built in 1973 and measuring 32 x 32 x 25 m, obtained ISO/IEC 17025 certification from the Italian accreditation entity Accredia in 2012. This recognition confirms the technological vocation of the Noventa di Piave site, assuring a high level of competence and the reliability of the results enabling the laboratory to supply independent testing services for:

- Power frequency voltage tests up to 640 kV rms
- Atmospheric impulse tests up to 1.6 MV
- Manoeuvre impulse tests up to 1.2 MV
- Radio interference voltage (RIV) tests up to 350 kV rms
- AC/DC temperature rise tests up to 8,000/12,000 A
- Mechanical endurance tests of line and earthing disconnectors

Quality and Reliability

The Quality Assurance goals at GE can be summarized as follows:

- To ensure that the equipment complies with all of the client's requirements and conditions and that it is built according to our own very strict manufacturing standards. To this end, GE maintains control over the manufacture of all equipment elements, insisting that its suppliers provide the same quality levels as our own workshops.

- To ensure that all equipment gives the final user the highest level of satisfaction, while offering reliability, continuity of service and ease of maintenance - thus offering lower operating costs.

Disconnectors are subjected to a complete set of type and routine tests in compliance with international standards.



Service and Support

Your Asset Management Partner



Customer Intimacy

From project design through commissioning to after sales customer service, GE places great emphasis on maintaining long-term relationships with its clients. The GE worldwide network of representatives remain in close contact with their customers around the world: GE helps utilities and industry to tackle grid challenges.

Service

GE specialists are available to ensure rapid disconnector installation and erection supervision, if the customer requires it.

Training

Training courses are available for all of GE's principle units, either on-site or in GE training facilities. These training courses facilitate the transfer of knowledge and techniques to its customers concerning installation, general operation and eventual equipment maintenance.

Maintenance

GE disconnectors are designed to offer a working life of over 40 years of trouble-free service with reduced maintenance.

Substitution, upgrading or overhaul of disconnectors is possible. GE's teams work closely with its customers to save costs by using new or refurbished components on existing equipment whenever possible.



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Helping to meet growing energy demands

Improving grid resiliency and energy efficiency

Upgrading and digitizing aging infrastructure

Enabling renewables and a diversified energy mix



Comprehensive Portfolio

Application Expertise

Engineering Services

Project Management

Field Service & Technical Training



Imagination at work

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