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# Mitsubishi Electric Achieves Successful Fault Current Interruption using 160kV DC Circuit Breaker

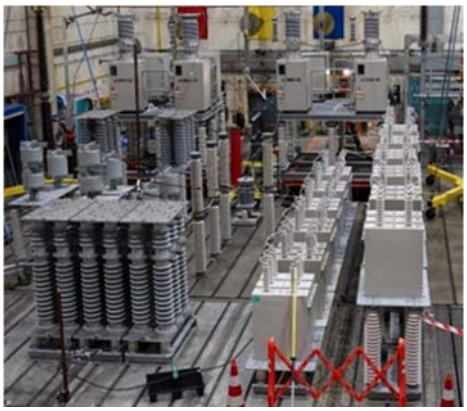
*Part of a European Commission Research project, the successful test will spur expansion of high-voltage direct current transmission networks*

**TOKYO, October 10, 2019** – Mitsubishi Electric Corporation (TOKYO: 6503) announced that its 160kV mechanical HVDC * circuit breaker (mechanical DCCB) prototype has successfully interrupted the peak current of 16kA that reproduces a fault in a real system within 7 milliseconds: a testing requirement specified in PROMOTioN * * project. The testing was conducted as part of the EU-funded research project PROMOTioN at the KEMA high power laboratories of DNV-GL, an international testing and certification service based in The Netherlands.

Following the successful test, Mitsubishi Electric is now proceeding commercialization of the DCCB. The proven reliability of its components is expected to help to develop stable, reliable and economical dc grid.

* High Voltage Direct Current: DC voltage higher than 1500V

* * Progress On Meshed HVDC Offshore Transmission Networks



The 160kV mechanical DCCB prototype used in the tests

**Background and Test Results**

HVDC transmission is a lower cost alternative to AC transmission and benefit from lower power loss over long distances. It is effective to connect offshore wind farms to onshore power grids in Europe, especially in the North Sea and the Baltic Sea. In recent years, the requirement for higher reliability and lower cost DCCBs has risen, driven by the need to expand HVDC transmission networks and ensure more continuous and stable operation.

AC current can be interrupted at current zero existing every half cycle, but in case of DC interruption, current zero have to be artificially created, since it lacks natural current zero. In addition, convertors are used to convert AC to DC prior to transmission, and it is therefore necessary to interrupt any abnormal current before the convertors shut down in cases of voltage drops occurring during any faults. High-speed interruption within a few milliseconds is therefore required for DCCBs. Mitsubishi Electric has successfully interrupted DC current with its mechanical DCCB prototype, which is capable of creating zero current artificially within such miniscule timeframes.

**Features of Mechanical DCCB**

1) ***High-speed abnormal current interruption***
   - High-speed fault current interruption is realized through the adoption of electro-magnetic repulsion drives in the circuit breaker.
2) ***Low conduction losses***
   - Mitsubishi Electric's concept is high efficiency HVDC transmission is realized by transmitting the current by physical means only, which involves minimal conduction loss, contrasting with the use of semiconductors.
3) ***Low cost and small footprint***
   - Inexpensive mechanical contact less susceptible to operating conditions is used in contrast to interruption methods using semiconductor elements. Without the need for clean room and cooling systems, low cost small footprint protection facilities for HVDC transmission can be realized.

**Future Development**

DCCBs of different voltage and current ratings can be developed to meet customer requirement and Mitsubishi Electric will continue development based on market situation.

**About DNV-GL**

DNV GL delivers world-renowned testing and advisory services to the energy value chain including renewables and energy management. DNV GL's expertise spans onshore and offshore wind power, solar, conventional generation, transmission and distribution, smart grids, and sustainable energy use, as well as energy markets and regulations. DNV-GL's experts support customers around the globe in delivering a safe, reliable, efficient, and sustainable energy supply. Learn more at www.dnvgl.com/power-renewables.

**About PROMOTioN**

PROMOTioN is a European Union funded Horizon 2020 project consortium, formed to address the technical, regulatory, financial and legal challenges for offshore HVDC transmission networks. It consists of 33 organizations including European HVDC manufacturers, Transmission System Operators (TSO), academic institutions, testing institutions and consultants. This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 691714. Mitsubishi Electric Europe B.V. is a European subsidiary of Mitsubishi Electric Corporation and is a participant member of the PROMOTioN project consortium. For more information please visit www.promotion-offshore.net.

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**About Mitsubishi Electric Corporation**

With nearly 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded a revenue of 4,519.9 billion yen (US$ 40.7 billion*) in the fiscal year ended March 31, 2019. For more information visit:
www.MitsubishiElectric.com

*At an exchange rate of 111 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2019