



UPFC PLUS

Fast, efficient and future-proof stabilization of AC grids

As a global leader in power transmission technology and a long-standing, trusted partner of public entities and private enterprises, such as utilities and grid operators, we have always been in the vanguard of technical development. We look back on a long history of trendsetting in power transmission projects around the world that have proven time and time again the reliability and outstanding quality of our products, solutions and services.

Energy ecosystems around the world are in a state of profound change. Reliable electricity is a basic requirement for societies. While details may vary from country to country, and even from supply area to supply area, there are challenges for grid operators and power producers. Underdeveloped or weak grids, mature and ageing infrastructure and liberalized markets including a growing share of alternative energy sources, leading to the associated disruption to business models.



Modern challenges for a legacy power grid

Increasingly decentralized energy systems and the associated fluctuating power flows pose new challenges for the existing, mature grid infrastructure. Thermal overloads in the lines and a growing number of cases in which frequency and voltage come quickly critically close to acceptable range limits, or even exceed them, threaten grid stability and the transmission infrastructure, and often require costly redispatch intervention to deal with current and voltage factors.

UPFC PLUS (Unified Power Flow Controller) - The missing piece to the puzzle

To effectively manage the transmission system and provide the stability and resilience required means operators must better utilise existing assets. This can be achieved by employing the dynamic load flow management solution with UPFC PLUS which is extremely faster to control and can manage both series and parallel compensation to keep lines within the n-1 criterion and the electricity flowing.

The UPFC PLUS can balance load flow in the AC grid, rapidly bypass overloaded line sections, provide reactive power and dynamic voltage control, and utilise assets safely closer to physical limits.

The UPFC PLUS is arranged as two voltage sources. One in parallel that controls voltage and one in series connected to the AC line. It provides reactive power compensation, voltage control at shunt and active power load flow control at the series side in one unit.

Compared to traditional stationary power flow controllers, UPFC PLUS controls the load flow in just milliseconds. UPFC PLUS thus stabilizes the AC grid even when critical situations develop suddenly (Grid Code n-1). That means UPFC PLUS lets you get the most from your existing grid capacity while maintaining maximum protection, reducing the risk of power failures, and minimizing redispatch costs.

Technical Advantages

Dynamic

With a response time of milliseconds, the UPFC PLUS reacts much faster as conventional solutions

Functional

UPFC PLUS offers additional functionality beside load flow control for example reactive power compensation

Flexible

All system voltages can be addressed up to 500kV

Efficient

Lower investment compared to other solutions that combine all functionalities. Lower losses and less harmonic emissions than comparable solutions

Powerful

Controlled power range is multiple of installed power depending on UPFC PLUS installation

Technical Advantages



Dynamics

ms



Functionality

+2



Flexibility

kV



Economic benefit



Performance

%

Benefits



Affordable investment costs



Make better use of existing infrastructure



Alternative to expanding infrastructure



Future-proof (Master Control, AI)



Fewer redispaches



Efficiency

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Summary of UPFC benefits

The UPFC PLUS applies the features and advantages of the well proven compact multi-level Voltage Sourced Converter (VSC) technology with its advanced control, high availability and reduced costs due to systematic standardization.

It provides answer to today's urgent challenges to keep the grid stable. UPFC PLUS can easily be implemented in an existing grid and allows fast reaction times for an efficient load flow management. With this option and the high dynamic control assets can be operated closer to physical limits.

Thus, UPFC is an innovative solution to comply with the growing requirements to the grid with dynamic load flow management that adapts easily to changing infeed from renewable sources by fluctuating consumption, even in case of faults in the infrastructure.

Siemens Energy opens the door to a new era in power supply by adapting our mature in-house technology.

For more information, please contact:

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