

industry reports

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Coordinating European Transmission



Union for the
Co-ordination of Transmission of Electricity

THE "UNION FOR THE CO-ORDINATION OF TRANSMISSION OF ELECTRICITY" (UCTE) is the association of transmission system operators in twenty four countries in continental Europe, providing a reliable market platform to all participants of the Internal Electricity Market (IEM) and beyond by efficient and secure electric "power highways".

Fifty years of joint activities laid the basis for a leading position in the world which the UCTE holds in terms of the quality of synchronous operation of interconnected power systems. It coordinates the operation and development of the electricity transmission grid from Portugal to Poland and from the Netherlands to Romania and Greece.

UCTE stands for an efficient and secure operation of the interconnected electrical "power highways" and gives signals to markets when system adequacy declines. Over more than fifty years, UCTE has been issuing all technical standards indispensable for a co-ordination of the international operation of high voltage grids which are all working at one »heart beat« - the 50 Hz UCTE frequency related to the nominal balance between offer and demand.

The UCTE network provides a safe electricity supply for some 430 million people in one of the biggest electrical synchronous interconnections worldwide. UCTE also monitors and supervises the development of the UCTE synchronous area. The resynchronization process of the two UCTE zones split in 1991 due to the war events in former Yugoslavia was successfully achieved on 10 October 2004. Presently, the following requests for enlargement of the UCTE area are investigated:

- The interconnection with Turkey

- The interconnection Tunisia - Libya that would bring the UCTE frequency up to Syria and Lebanon, and, most significantly,

- The assessment via a major feasibility study on the interconnection of the two largest systems (UCTE and IPS/UPS) - that would result in one electricity system spreading from Lisbon to Vladivostok.

Following the liberalization of the European electricity market (that resulted in a steep increase of cross border flows), and the un-bundling of electricity sector (separating vertically integrated utilities into respective generation, transmission companies

and distribution companies), there is a need to make European security and reliability standards enforceable for all interconnected TSO and, in a later second step, to all grid users.

The UCTE operational standards are now being brushed up and transformed into the open document Operation Handbook gathering some 8 policies that might be commented by all interested stakeholders via an internet-based consultation process.

The enforcement among TSOs of these standards is supported by a Multi-lateral Agreement (MLA) which entered into force on 1 July 2005.

UCTE has been monitoring for decades the adequacy (balance between generation and consumption to be steadily maintained) of the interconnected systems, giving investors and market players signals for construction of generation and transmission facilities. UCTE provides comprehensive statistics on electricity generation and transmission in the European mainland.

Key challenge: To keep the quality of the UCTE system at high level and to provide a sound basis for electricity markets in a broader Europe and its enlargement to the benefit of all market players and consumers. ■

1 UCTE map

(Union for the Co-ordination of Transmission of Electricity)



For more
information visit:
www.ucte.org

IEEE Guide for Distribution Protection

IEEE C37.230, GUIDE FOR
PROTECTIVE RELAY APPLICATIONS
TO DISTRIBUTION LINES.

THE IEEE PES PSRC LINE PROTECTION SUBCOMMITTEE formed Working Group D5 to develop a guide to describe principles, practices and special topics in protecting distribution lines. The result of the working group's efforts is IEEE Standard C37.230 Guide for Protective Relay Applications to Distribution Lines.

The Guide gives a thorough overview of the fundamentals in protecting distribution systems. Among the topics discussed are the various types of faults that can occur on distribution lines, the impact of fault impedance, characteristics of loads, harmonics and the impact of transients on distribution lines. These topics assure that the user has the needed basics to use the Guide.

Three main methods of grounding for distribution circuits are discussed:

- solidly grounded systems
- ungrounded systems
- impedance grounded systems



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historical application of adaptive relaying is permitting fast tripping of circuit interrupting devices for the first one or two trip operations during a fault event and then disabling them for the remainder of the event.

Another application where numerical relays with multiple setting groups are installed is automatic changing of setting groups to provide appropriate protection functionality to adjust for changes in system conditions.

Interconnection of Distributed Resources (DR) on distribution circuits is becoming increasingly more common in the utility industry. DR can impact the protection of the corresponding distribution circuit, including coordination of protective devices on the interconnected circuit with those of adjacent circuits. DRs also affect the coordination with the substation transformer backup protection, the sensitivity of utility relays for faults downstream of the DR interconnection, system grounding, reclosing and islanding of utility load on the distribution circuit with the DR.

The use of communications channels connected to microprocessor-based relays in order to communicate with other IEDs

has been increasing on distribution circuits in order to improve the speed and dependability of protective schemes to improve reliability and power quality. For looped-radial and looped distribution systems, the substation relays and IEDs can communicate with each other to determine the location of a fault, and then execute the appropriate tripping and closing of devices to isolate the faulted section and provide continuity of service to the remainder of the distribution system.

Single phase tripping of distribution circuits offers some advantages to three phase tripping for improved reliability and power quality.

For instance, upon occurrence of a single phase-to-ground fault on a distribution circuit, single phase tripping can provide continuity of service to customers supplied from the two unfaulted phases while the faulted phase is removed from service. However, care should be exercised applying single phase tripping to circuits with ungrounded capacitor banks, and with three phase motors. Also, ferroresonant overvoltages are possible for circuits with grounded capacitor banks and ungrounded transformers.

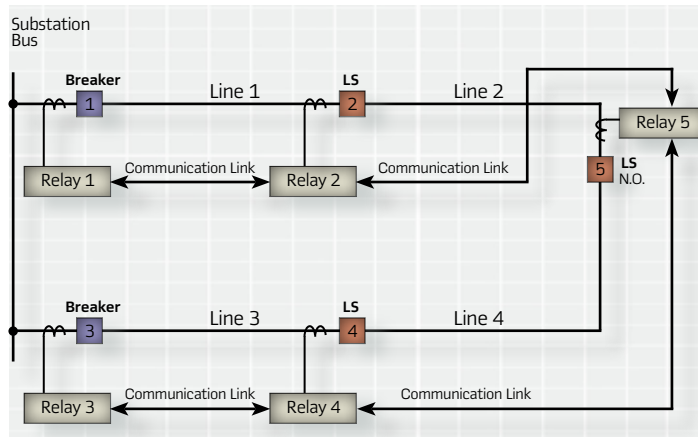
Methods of detection of ground faults on ungrounded systems and on resonant ground systems are also discussed in the Guide.

The Guide is available through the IEEE Standards Department.

At the time this standard was completed, the working group had the following membership:

William P. Waudby, *Chair*; Randy Crellin, *Vice Chair*; John Appleyard, Ron Beazer, Ken Behrendt, Martin Best, Kenneth A. Birt, Gustavo Brunello, Jim Burke, Pat Carroll, Albert Darlington, Ratan Das, Ahmed Elneweihi, Fredric Friend, Rafael Garcia, Irwin Hasenwinkle, Roger Hedding, Randy Horton, Richard Hunt, Shoukat Khan, Ljubomir Kojovic, Ed Krizauskas, Raluca Lascu, Larry Lawhead, Walter McCannon, Michael McDonald, Dean Miller, Anthony Napikoski, Robert Pettigrew, Sam Sambasivan, Mark Schroeder, Tony Seegers, Tarlochan Sidhu, Charlie Sufana, Jon Sykes, Betty Tobin, Joe Uchiyama, Ron Westfall, Inma Zamora, Karl Zimmerman, Stan Zocholl

1 Communication enhanced trip and restore scheme on a looped radial distribution system



2 Three device coordination

