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PEOPLE'S REPUBLIC OF CHINA**

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**Ultra-high voltage controllable shunt reactor relay protection
configuration and tuning technical specifications
(English Translation)**

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Foreword

This standard is formulated in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Power Industry Relay Protection Standardization Technical Committee.

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1 Scope

This standard specifies the relay protection configuration and setting technical principles of transformer-type and magnetic-control-type controllable shunt reactors.

Technical requirements are put forward for the configuration and setting of related relay protection of the power grid where the device is located.

This standard applies to the controllable shunt reactors with voltage levels of 500kV and 750kV and the grid connected to them. Other voltage levels can be referred to Follow the execution.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document.

For undated references, the latest version (including all amendments) applies to this document.

GB/T 2900.1 Basic terminology for electrical engineering GB/T 2900.17 Electrical terminology measuring relay GB/T 2900.49 Electrician Terminology Power System Protection GB/T 2900.95 Electrotechnical terminology transformer, voltage regulator and reactor GB/T 14285 Technical Regulations for Relay Protection and Safety Automatic Equipment GB/T 15145 General technical conditions for transmission line protection devices GB/T 20840.2 Transformer Part 2: Supplementary Technical Requirements for Current Transformer GB/T 31955.1 Technical Specification for Control and Protection System of Ultra-High Voltage Controllable Shunt Reactor Part 1: Graded Regulator DL/T 242-2012 General technical conditions for high-voltage shunt reactor protection devices DL/T 478 General technical requirements for relay protection and safety automatic devices DL/T 559 220kV~750kV power grid relay protection device operation setting regulation DL/T 670 General technical conditions for bus protection devices DL/T 866 Current transformer and voltage transformer selection and calculation guide DL/T 886 Technical guidelines for 750kV power system relay protection DL/T 1193-2012 Flexible transmission terms DL/T 1217 Technical specification for magnetron controllable shunt reactor DL/T 1376-2014 Technical specification for ultra-high voltage graded controllable shunt reactor

3 Terms and definitions

GB/T 2900.1, GB/T 2900.17, GB/T 2900.49, GB/T 2900.95, DL/T 1376-2014 and the following terms defined and definitions apply to this document.

Controlled shunt reactor; CSR A reactor whose reactance value can be adjusted online in parallel with the power system.

[DL/T 1376-2014 definition 3.1] 3.2 Transformer type controlled shunt reactor; TTCSR A controllable shunt reactor that adjusts the reactance value by changing the equivalent impedance of the low-voltage side of the high-impedance transformer. The reactance value can only be it is limited to switching between levels and belongs to the hierarchical adjustable controllable shunt reactor.

[DL/T 1193-2012, definition 4.5.1, with modification] 3.3 Magnetically controlled shunt reactor; MCSR the controllable shunt reactor that realizes the adjustment of the reactance

value by changing the saturation degree of the reactor core, its reactance value can be continuously changed, which belongs to it is a continuously adjustable controllable shunt reactor.

[DL/T 1193-2012, definition 4.5.2, with modification] 3.4 Line side controlled shunt reactor as a part of the line, it is generally connected to the line through an isolating switch, and can only be turned on and back together with the line.

Reactor, the line-side controllable shunt reactor is usually grounded through the neutral point reactor.

[DL/T 1193-2012 definition 4.5.5] 3.5 Bus side controlled shunt reactor for bus A controllable shunt reactor that is connected to the bus through a circuit breaker and can be switched on and off separately. The controllable shunt reactor for the bus is usually directly grounded.

[DL/T 1193-2012 definition 4.5.6] 3.6 Grid side winding Winding directly connected to the grid.

[DL/T 1193-2012 definition 4.5.8] 3.7 Control winding Windings that are electrically connected to the controllable shunt reactor adjustment and control device can be controlled by changing the current flowing through the windings Adjustment of parallel reactor capacity.

[DL/T 1193-2012 definition 4.5.9] 3.8 Auxiliary winding Windings with auxiliary functions such as connecting filters or providing power for adjustment and control devices.

[DL/T 1193-2012 definition 4.5.10] 3.9 Magnetic balance differential protection for the transformer-type controllable shunt reactor, the differential protection is constituted by the principle of the magnetic field ampere-turn balance between the control winding and the grid-side winding. Its guarantee the protection range includes the control winding and the grid-side winding of the reactor, which is also called the large differential protection of the controllable shunt reactor.

[DL/T 242-2012 definition 3.4]

4 General

4.1

The controllable shunt reactor in this standard includes two types. transformer type and magnetic control type. See Appendix A for its basic principles.

4.2

Coordination of primary and secondary equipment selection should be done in the planning and design stage, and the adaptability of relay protection should be fully considered to avoid special wiring this method increases the difficulty of relay protection configuration and

setting.

4.3

The configuration and setting of the controllable shunt reactor protection should be coordinated with the operation requirements of the power grid, following the "strengthening the main protection and optimizing the backup protection" the principle of protection configuration and setting.

4.4

The adaptability of the relay protection to the controllable shunt reactor is preferably realized through the device's own principles and algorithms. At the same time, it should be combined with operating characteristics Correctly and reasonably set the protection. Prioritize the implementation of related protection functions through the protection device itself, and reduce the amount of external input as much as possible to reduce Dependence on related circuits and equipment.

4.5

The setting value of the protection device should meet the requirements of the protection function, and be as simple and easy to set as possible; multiple sets of switchable setting should be set.

Value group; the protection device should not malfunction during the setting or switching process.

4.6

The controllable shunt reactor protection device for the busbar should have T zone or short lead protection function, or be equipped with independent T zone or short lead protection.

Protective device, as the protection of the reactor head bushing to the lead area of the circuit breaker.

4.7

The configuration and setting of the relay protection of the power grid where the controllable shunt reactor is located should consider the influence of the controllable shunt reactor.

The adaptability of relay protection is studied and demonstrated.

4.8

The protection function and performance of the controllable shunt reactor valve control system shall meet the requirements of GB/T 31955.1, DL/T 1217, and DL/T 1376.

4.9

In this standard, the transformer-type controllable shunt reactor takes the line-side controllable shunt reactor connected with a 3/2 circuit breaker as an example. The magnetic control type is controllable.