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Research on Technical Specification of Co-phase Power Supply Device for Heavy-haul Railway

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KEY POINTS IN FORMULATING TECHNICAL SPECIFICATIONS

The structure, capacity, control method and operation mode of the core equipment CPD are the key points in the formulation of technical specifications, among which the operation mode is the most important key point. As shown in Fig.1, CPD needs to meet the following three modes of operation conditions. 1) It can complete the comprehensive compensation of negative sequence, reactive power and harmonics during normal operation. 2) CPD can be removed immediately when a fault occurs, and the system switches to unilateral power supply mode. 3) CPD can achieve voltage compensation at the end of the supply arm in the over-zone power supply mode.

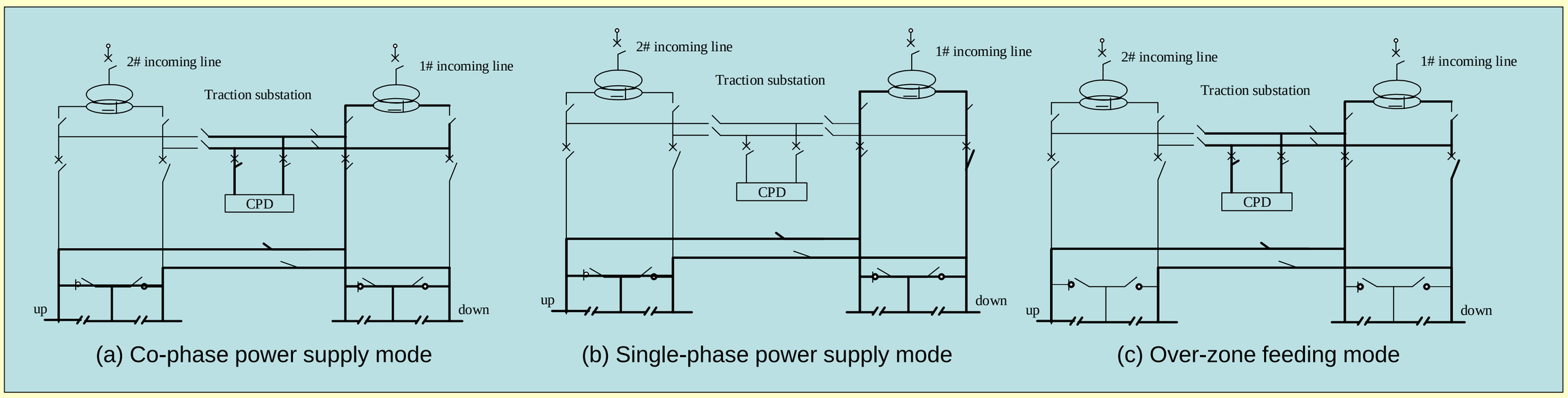

Fig. 1 Operating modes of co-phase traction power supply systems

MAIN CONTENTS OF TECHNICAL SPECIFICATIONS FOR CPD

Based on the above key points, and taking the Bazhun Railway using the co-phase power supply technology as an example, the technical specifications of CPD are formulated as follows.

Technical Indicators	Specification of indicators
Scope of Stable Work	The rated voltage of the catenary is 27.5kV, and the devices should work stably within 19~31.5kV, and run at full power within 22.5~29kV
Basic Performance	Active power can be transmitted in both directions, and each port can independently emit inductive or capacitive reactive power and harmonic current (13th or less)
Responding Speed	The responding speed of the AC/DC/AC converter for power control should not exceed 10ms
Power Factor	When only active power is output, power factor is not less than 0.98 on the 27.5kV side
AC Side Harmonic Current Distortion	Less than 3% (only when outputting active power)
Converter Efficiency	More than 98.5%
Overload Capacity	Run for a long time—when operating at 1.1 times of rated power, 60 seconds/10 minutes—1.2 times of rated power
Lifetime	15 years

Summary

Based on the key points, the main technical indicators of the co-phase power supply device for heavy haul railways are given, which are of guiding significance for the both reformation and new project of the co-phase traction power supply system. Particularly, it lays a foundation for the ongoing Bazhun heavy haul railway co-phase power supply reformation project.