Design of auxiliary front-end converters for adjustable speed drives systems

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Abstract

Diode rectifiers or thyristor rectifiers are often used to convert AC power to DC power for adjustable speed drives systems. The advantages of these conventional rectifiers are their simplicity and reliability. The drawbacks include the harmonic current distortion, the lack of re-generation and susceptibility to voltage sags. In this study, an auxiliary front-end converter for the adjustable speed drive system is proposed. When the drive system consumes power, the auxiliary front-end converter compensates the harmonic current of the rectifier. When drive system re-generates, the auxiliary front-end converter channels the energy back into the utility. Furthermore, the auxiliary front-end converter can utilize its boost capability to support the DC bus voltage of the rectifier when voltage sag occurs. The performances of the proposed auxiliary front-end converter are validated by laboratory test results.

Keyword：adjustable speed drives