SIEMENS

Jens Weidauer, Richard Messer

# Electrical Drives

## Principles • Planning • Applications • Solutions

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Principles · Planning · Applications · Solutions

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and Richard Messer

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# Foreword

Electrical drives are the most important source of mechanical energy in machines and industrial plant. In our modern world, they ensure that motion can take place, and that transport and manufacturing processes are possible at all. Although the technical field of electrical drives is over 100 years old, today it is more dynamic and diverse than ever.

It starts with the electric motors themselves, the heart of all electrical drives. Today, they are not only available in the widest range of designs and power classes – from standard motors for direct-on-line operation to highly-efficient servo motors – but they also distinguish themselves through their ever more ingenious design principles and use of novel materials. Smaller, lighter, and more efficient electric motors give designers new degrees of freedom, pushing ahead the development of machines, plant equipment, and electrical vehicles.

Drive controllers are also becoming more powerful and smaller due to fast, low-loss switching power semiconductors, faster microprocessors, as well as modern manufacturing technologies. In combination with innovative electrical motors, the torque, speed, and position of electrical drives can today, at any given time, be set exactly as required by the manufacturing or transport process. In many instances, the controller and electric motor are brought together and combined in one device. In particular, electromobility is driving the development of real mechatronic systems, in which gearbox, electric motor, and drive controller merge together to provide customised drive solutions.

As part of a modern automation solution, electrical drives must be universally coordinated. To enable this, they are equipped with communication interfaces as well as integrated control, safety, and diagnostic functions going well beyond those of the classic drive controller. These allow the planner to implement the required coordination functions centrally, distributed, or in the drive itself.

Through both technical advancements and increasingly finer adaptations for special requirements, the wealth of types of electrical drives will continue to increase. Good orientation in the world of electrical drives is therefore indispensable for both decision makers and designers. This book provides this. Both the principles as well as the application of electrical drives are presented systematically and clearly. This comprehensive overview will benefit the reader and provide added confidence when evaluating drive solutions.

Now in its third edition, this “standard work of electrical drives” will continue to broaden the knowledge of electrical drives, and for many technicians be a useful guide when designing efficient machines, plant equipment, and electrical vehicles.

Prof. Dr. Siegfried Russwurm
Member of the Managing Board of Siemens AG

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