

SIEMENS

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Electrical Drives

Principles • Planning • Applications • Solutions



Electrical Drives

Principles · Planning · Applications · Solutions

by Jens Weidauer
and Richard Messer

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Contents

1 Electrical drives at a glance	12
1.1 A short history of electrical drives	12
1.2 Design of modern electrical drives	16
1.3 Classification of electrical drives	18
1.3.1 Speed variability	18
1.3.2 Motor and controller types	21
1.3.3 Technical data	22
2 Mechanical principles	26
3 Electrical principles	28
3.1 Fields in electrical engineering	28
3.2 Developing torque	30
3.2.1 Lorentz force	30
3.2.2 Current carrying loop in a magnetic field	31
3.2.3 Induced voltage	32
3.2.4 Quantities and equations of electrical engineering	33
3.2.5 Components of electrical engineering	34
4 Fixed-speed and variable-speed drives with DC motors	36
4.1 DC drives	36
4.2 The DC motor	37
4.2.1 Operating principle	37
4.2.2 Construction and electrical connections	42
4.2.3 DC motor maintenance	43
4.2.4 Mathematical description	44
4.2.5 Controllability	46
4.3 Fixed-speed drives using DC motors	47
4.3.1 Design and application	47
4.3.2 Shunt-wound characteristic	48
4.3.3 Series-wound characteristic	50
4.4 Variable-speed drives using DC motors	51
4.4.1 Design and application	51
4.4.2 Converter	53
4.4.3 Speed encoders for DC drives	59
4.4.4 Control structure	61

5 Fixed-speed and variable-speed drives with asynchronous motors	64
5.1 Drives with asynchronous motors	64
5.2 The asynchronous motor	65
5.2.1 Functional principle	65
5.2.2 Construction and electrical connections	68
5.2.3 Mathematical description	71
5.2.4 Controllability	76
5.3 Fixed-speed drives using asynchronous motors	77
5.3.1 Design and applications	77
5.3.2 Starting an asynchronous motor	79
5.3.3 Stopping an asynchronous motor	85
5.4 Variable-speed drives with asynchronous motors	85
5.4.1 Design and applications	85
5.4.2 Changing the speed using contactors	86
5.4.3 Speed changing using frequency converters	89
5.4.4 V/f control	96
5.4.5 Vector-control operation	99
5.4.6 Speed encoder	103
5.5 Modern frequency converter functions	107
5.5.1 General	107
5.5.2 Power options	107
5.5.3 Electronic options	109
5.5.4 Process interfaces	111
5.5.5 User interface	113
5.5.6 Open-loop and closed-loop functions	114
6 Servo drives	123
6.1 Design and application	123
6.2 Classification of servo drives	125
6.2.1 Control functions	125
6.2.2 Motor types, types of amplifier	126
6.2.3 Technical data	128
6.3 Speed and position encoders for servo drives	129
6.3.1 Classification and characteristics	129
6.3.2 Commutation encoder	133
6.3.3 Resolver	134
6.3.4 Sine/cosine encoder	137
6.3.5 Absolute encoder	139
6.4 Servo drives using DC motors	140
6.4.1 Design and application	140
6.4.2 DC motors for servo drives	140
6.4.3 Controllers for servo drives using DC motors	141
6.4.4 Control scheme	145
6.5 Servo drives with brushless DC motors (block commutation)	146
6.5.1 Design and applications	146
6.5.2 The brushless DC motor	147
6.5.3 Frequency converters for servo drives with brushless DC motors	149
6.5.4 Control scheme	151

6.6 Servo drives using synchronous motors (sinusoidal commutation)	152
6.6.1 Design and application	152
6.6.2 The synchronous motor	153
6.6.3 Frequency converters for servo drives with synchronous motors	155
6.6.4 Control scheme	155
6.7 Servo drives with asynchronous motors	157
6.8 Direct drives	158
6.8.1 Designs and applications	158
6.8.2 Linear motor	160
6.8.3 Torque motor	162
6.9 Control of and tuning servo drives	163
6.9.1 General quality criteria for evaluating control loops	163
6.9.2 Servo drive control loops	167
6.9.3 Tuning the current control loop	168
6.9.4 Tuning the speed control loop	171
6.9.5 Tuning the position control loop	175
6.10 Functions of modern servo amplifiers	177
6.10.1 General	177
6.10.2 Power options	178
6.10.3 Electronic options	178
6.10.4 Process interfaces	178
6.10.5 User interfaces	179
6.10.6 Closed-loop and open-loop control functions	179
 7 Stepper drives	 182
7.1 Designs and applications	182
7.2 Classification of stepper drives based upon motor type	183
7.3 Technical data	184
7.4 The stepper motor	185
7.4.1 General	185
7.4.2 Permanent magnet stepper motor	185
7.4.3 Hybrid stepper motor	187
7.5 Controllers	188
7.6 Control characteristics	192
 8 Electrical drive systems at a glance	 194
8.1 From drive to drive system	194
8.2 Classification of electrical drive systems	195
8.2.1 Components in a drive system	195
8.2.2 Functionality of drive systems	198
8.2.3 Information flow in drive systems	200
8.2.4 Energy flow between drives	202
8.2.5 Electromagnetic interference	203
8.3 Planning of electrical drives as a system task	203

9 Fieldbuses for electrical drives	204
9.1 Motivation and functional principle	204
9.2 Overview of fieldbuses in common use	208
9.3 AS-Interface	209
9.3.1 Overview	209
9.3.2 Topology, wiring, physics	210
9.3.3 Access method	213
9.4 CAN	213
9.4.1 Overview	213
9.4.2 Topology, wiring, physical interface	215
9.4.3 Access method	216
9.4.4 Engineering	218
9.5 PROFIBUS DP	218
9.5.1 Overview	218
9.5.2 Topology, wiring, physical interface	219
9.5.3 Access method	221
9.5.4 PROFIBUS DP-V2	223
9.5.5 Engineering	225
9.6 PROFINET I/O	228
9.6.1 Overview	228
9.6.2 Topology, wiring, physical interface	230
9.6.3 Access method	232
9.6.4 Device descriptions for engineering	237
 10 Process control with electrical drives	 238
10.1 Definition of terms	238
10.2 Process control with single drive systems	238
10.2.1 Components	238
10.2.2 Example: Level control with a fixed-speed drive	239
10.2.3 Example: Pressure control	241
10.2.4 Example: Elevator drive	243
10.3 Process control with multi-drive systems	245
10.3.1 Components	245
10.3.2 Example: Carriage with mechanically coupled drives	248
10.3.3 Example: Coating line with tension and winding drives	251
10.4 Drives with integrated technology functions	260
 11 Motion control with electrical drives	 263
11.1 Definition of terms and functions	263
11.2 Representing and processing position information	266
11.3 Positioning	269
11.3.1 Applications and fundamentals	269
11.3.2 Positioning controller	269
11.3.3 Machine data	274
11.3.4 Position detection, position processing and referencing	275

11.4 Synchronisation	279
11.4.1 Applications and principles	279
11.4.2 Synchronisation control	280
11.4.3 Machine data	293
11.5 Motion control with PLCopen	293
11.6 Safety functions in electrical drives	296
11.6.1 Applications and principles	296
11.6.2 Safe stop functions	298
11.6.3 Safe movement functions	300
11.6.4 Safe fieldbuses	302
12 EMC and electrical drives	303
12.1 Principles	303
12.1.1 Background and definition of terms	303
12.1.2 EMC interference model	304
12.1.3 Coupling mechanisms	305
12.1.4 Mathematical description	310
12.2 Electrical drives as a source of interference	314
12.2.1 Galvanic disturbances generated by converter-fed DC drives, countermeasures	314
12.2.2 Galvanic disturbances generated by DC-link converters, countermeasures	317
12.2.3 Galvanic interference generated by the inverter, countermeasures	319
12.2.4 Radiated interference due to the inverter	325
12.2.5 Radiated interference arising from digital drives, countermeasures ...	327
12.3 Electrical drives as susceptible devices	328
12.3.1 General	328
12.3.2 Galvanic interference, countermeasures	328
12.3.3 Capacitive interference, countermeasures	330
12.3.4 Inductive interference, countermeasures	331
12.4 EMC guidelines	333
13 Planning electrical drives	335
13.1 Approach	335
13.2 Selecting the drive type	336
13.3 Selecting the motor	339
13.3.1 Approach	339
13.3.2 Taking a gearbox into consideration	339
13.3.3 Sizing the motor using mechanical parameters	345
13.3.4 Thermal sizing of the motor	351
13.3.5 Constructional motor selection	357
13.3.6 Selecting the encoder	361
13.4 Sizing the converter for variable-speed and servo drives	364
13.4.1 Electrical sizing of the converter	364

13.4.2 Thermal sizing of the converter	364
13.4.3 Thermal sizing of the supply infeed	370
13.4.4 Sizing the supply infeed based on the DC link capacitance	373
13.4.5 Sizing the braking chopper and braking resistor	374
13.4.6 Selecting the power options	377
13.4.7 Electronic options, accessories, connecting cables	377
13.5 Planning example	378
13.5.1 Application data	378
13.5.2 Sizing	379
14 Troubleshooting electrical drives	383
14.1 Avoiding faults and troubleshooting	383
14.2 Possible faults and errors	383
14.2.1 Motor faults	385
14.2.2 Encoder faults	386
14.2.3 Faults in the controller	387
14.2.4 Supply faults	388
14.2.5 Communication errors	389
14.2.6 EMC problems	390
14.2.7 Planning errors	391
14.2.8 Parameter setting errors	392
14.3 Fault indication	393
Index	395

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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

Contents

- 1 Electrical drives at a glance** 12
 - 1.1 A short history of electrical drives 12
 - 1.2 Design of modern electrical drives 16
 - 1.3 Classification of electrical drives 18
 - 1.3.1 Speed variability 18
 - 1.3.2 Motor and controller types 21
 - 1.3.3 Technical data 22

- 2 Mechanical principles** 26

- 3 Electrical principles** 28
 - 3.1 Fields in electrical engineering 28
 - 3.2 Developing torque 30
 - 3.2.1 Lorentz force 30
 - 3.2.2 Current carrying loop in a magnetic field 31
 - 3.2.3 Induced voltage 32
 - 3.2.4 Quantities and equations of electrical engineering 33
 - 3.2.5 Components of electrical engineering 34

- 4 Fixed-speed and variable-speed drives with DC motors** 36
 - 4.1 DC drives 36
 - 4.2 The DC motor 37
 - 4.2.1 Operating principle 37
 - 4.2.2 Construction and electrical connections 42
 - 4.2.3 DC motor maintenance 43
 - 4.2.4 Mathematical description 44
 - 4.2.5 Controllability 46
 - 4.3 Fixed-speed drives using DC motors 47
 - 4.3.1 Design and application 47
 - 4.3.2 Shunt-wound characteristic 48
 - 4.3.3 Series-wound characteristic 50
 - 4.4 Variable-speed drives using DC motors 51
 - 4.4.1 Design and application 51
 - 4.4.2 Converter 53
 - 4.4.3 Speed encoders for DC drives 59
 - 4.4.4 Control structure 61

5 Fixed-speed and variable-speed drives with asynchronous motors	64
5.1 Drives with asynchronous motors	64
5.2 The asynchronous motor	65
5.2.1 Functional principle	65
5.2.2 Construction and electrical connections	68
5.2.3 Mathematical description	71
5.2.4 Controllability	76
5.3 Fixed-speed drives using asynchronous motors	77
5.3.1 Design and applications	77
5.3.2 Starting an asynchronous motor	79
5.3.3 Stopping an asynchronous motor	85
5.4 Variable-speed drives with asynchronous motors	85
5.4.1 Design and applications	85
5.4.2 Changing the speed using contactors	86
5.4.3 Speed changing using frequency converters	89
5.4.4 V/f control	96
5.4.5 Vector-control operation	99
5.4.6 Speed encoder	103
5.5 Modern frequency converter functions	107
5.5.1 General	107
5.5.2 Power options	107
5.5.3 Electronic options	109
5.5.4 Process interfaces	111
5.5.5 User interface	113
5.5.6 Open-loop and closed-loop functions	114
6 Servo drives	123
6.1 Design and application	123
6.2 Classification of servo drives	125
6.2.1 Control functions	125
6.2.2 Motor types, types of amplifier	126
6.2.3 Technical data	128
6.3 Speed and position encoders for servo drives	129
6.3.1 Classification and characteristics	129
6.3.2 Commutation encoder	133
6.3.3 Resolver	134
6.3.4 Sine/cosine encoder	137
6.3.5 Absolute encoder	139
6.4 Servo drives using DC motors	140
6.4.1 Design and application	140
6.4.2 DC motors for servo drives	140
6.4.3 Controllers for servo drives using DC motors	141
6.4.4 Control scheme	145
6.5 Servo drives with brushless DC motors (block commutation)	146
6.5.1 Design and applications	146
6.5.2 The brushless DC motor	147
6.5.3 Frequency converters for servo drives with brushless DC motors	149
6.5.4 Control scheme	151

- 6.6 Servo drives using synchronous motors (sinusoidal commutation) 152
 - 6.6.1 Design and application 152
 - 6.6.2 The synchronous motor 153
 - 6.6.3 Frequency converters for servo drives with synchronous motors 155
 - 6.6.4 Control scheme 155
- 6.7 Servo drives with asynchronous motors 157
- 6.8 Direct drives 158
 - 6.8.1 Designs and applications 158
 - 6.8.2 Linear motor 160
 - 6.8.3 Torque motor 162
- 6.9 Control of and tuning servo drives 163
 - 6.9.1 General quality criteria for evaluating control loops 163
 - 6.9.2 Servo drive control loops 167
 - 6.9.3 Tuning the current control loop 168
 - 6.9.4 Tuning the speed control loop 171
 - 6.9.5 Tuning the position control loop 175
- 6.10 Functions of modern servo amplifiers 177
 - 6.10.1 General 177
 - 6.10.2 Power options 178
 - 6.10.3 Electronic options 178
 - 6.10.4 Process interfaces 178
 - 6.10.5 User interfaces 179
 - 6.10.6 Closed-loop and open-loop control functions 179
- 7 Stepper drives 182**
 - 7.1 Designs and applications 182
 - 7.2 Classification of stepper drives based upon motor type 183
 - 7.3 Technical data 184
 - 7.4 The stepper motor 185
 - 7.4.1 General 185
 - 7.4.2 Permanent magnet stepper motor 185
 - 7.4.3 Hybrid stepper motor 187
 - 7.5 Controllers 188
 - 7.6 Control characteristics 192
- 8 Electrical drive systems at a glance 194**
 - 8.1 From drive to drive system 194
 - 8.2 Classification of electrical drive systems 195
 - 8.2.1 Components in a drive system 195
 - 8.2.2 Functionality of drive systems 198
 - 8.2.3 Information flow in drive systems 200
 - 8.2.4 Energy flow between drives 202
 - 8.2.5 Electromagnetic interference 203
 - 8.3 Planning of electrical drives as a system task 203