





MASTER INDEX

The 12 books in your Synchronizer CD Library contain a wealth of knowledge for any engineer who needs a deeper understanding of both the theory behind and practical application of high-horsepower electric motor technology. This index details the major subjects covered within the various texts.

However, before you use this, allow us to make a few observations, suggestions, and explanations.

1. Because many of these documents are graphics intensive, file sizes on some texts run 30MB, 40MB or more. If you intend to print from this CD, use the fastest printer you have available.
2. NAVIGATION: Typically, you will find two icons on every page of the twelve texts. The Blue "C" will take you to that specific book's Table of Contents. (Books without a Contents page do not have this icon.) The Red "I" takes you back to this page.  
3. Occasionally, you will find this index has *multiple references for the same topic*. Typically, this is because that general subject has been covered in more than one book. By looking at the Book Subject, you should be able to determine which entry is most appropriate for your search.
4. To help your search, we have also included four related documents.
 - **Synopsis** – Contains a brief overview of the content each of the twelve texts.

- **Diagrams** – A sub-index which lists only the commonly referenced diagrams from all twelve texts. Though those same diagrams also are listed in this master index, we gathered them into this separate document to help speed your search.
 - **Formulas** – Another sub-index, listing only the formulae commonly used in this field. Again, those same formulas also are listed in this master index, but you might find it faster to link right to that other document.
 - **Charts** – A third sub-index. This one contains the key reference charts found within the library. Once more, those charts also are listed in this master index.
5. Though this Master Index contains over 800 entries, please do not consider it 100% complete. If you cannot find what you are looking for, please feel free to contact us by phone between 8 AM and 4:30 PM central time at **612.378.8000**. If you prefer, we can provide further assistance via e-mail at em@electricmachinery.com.
 6. Finally, we welcome your comments and suggestions at any time. Simply use the phone number or e-mail address listed above.

TOPIC	BOOK SUBJECT	PAGE
2-Pole Motors	Induction Motors	19
3-Phase Power Supply, Diagram	Synchronous Motors	4-5
AC Current, How Generated	Eng. Driven Generators	6
Accelerating Time and Losses, Starting	Motor Starting: I & M	21-22
Accelerating Time, Determining	AC Mtrs & Cntrls: Fundamentals	29
Accelerating Torque	Induction Motors	7
Across-the-Line Starters, Adjustable-Speed Magnetic Drive, Induction Motor Control	Induction Motors	26
Across-the-Line Starters, Reversing, Adjustable-Speed Magnetic Drive	Induction Motors	26
Actuating Devices, Ampli-Speed	Adjustable Speed	13
Adjustable Speed	Synchronous Motors	30-35
Adjustable Speed Drives, Mineral Processing Applications	Applications	55-57
Adjustable Speed Drives, Paper Industry Applications	Applications	53
Adjustable Speed Mag. Drives, HP Slip Loss, Formula	AC Mtrs & Cntrls: Fundamentals	49
Adjustable Speed Magnetic Drives	AC Mtrs & Cntrls: Fundamentals	48
Adjustable-Speed Magnetic Drive	Induction Motors	28
Adjustable-Speed Magnetic Drive, Induction Motor Control	Induction Motors	26
Air Control Unit	P-Type Motors	10
Air-Gap Tolerances	Installation & Maintenance	24
Alternating Current, 1, 2, & 3 Phase, Diagram	Power Factor	5
Alternating Current Characteristics	Power Factor	4
Alternating-Current Formulas	Induction Motors	5

TOPIC	BOOK SUBJECT	PAGE
Amortisseur Winding Losses	AC Mtrs & Cntrls: Fundamentals	30
Amortisseur Windings, Torque	Synchronous Motors	10-11
Ampli-Speed Control Wiring, Diagram	Adjustable Speed	14
Ampli-Speed Drives, Fundamental Equations	Adjustable Speed	8
Ampli-Speed Slip-Torque Characteristics, Diagram	Adjustable Speed	8
Angle of Lag of Rotor Behind Stator, Diagram	Eng. Driven Generators	10
Apparent Power, Formula	Eng. Driven Generators	5
Apparent Power, Formula	Power Factor	4
Appendices	P-Type Motors	20
Applicable Standards	P-Type Motors	18
Application Considerations, General	Applications	5-9
Applications of Magnetic Drives	Adjustable Speed	10-13
Applications, Synchronous Motors	Synchronous Motors	24-29
Approx. Full-Voltage Starting KVA of Unity Power Factor Synchronous Motors, Chart	Synchronous Motors	21
Armature Reaction	Eng. Driven Generators	8
Authorized Test Institutions in Europe	P-Type Motors	26
Auto-Transformer Induction Motor Starting (Closed Transition), Chart	Induction Motors	21
Auto-Transformer Starting (Closed-Transition), Diagram	Motor Starting: I & M	8
Auto-Transformer Starting (Open-Transition), Diagram	Motor Starting: I & M	8
Babbitts, Composition of, Chart	Installation & Maintenance	30
Ball Bearing, Names of Parts, Diagram	Installation & Maintenance	31
Banbury Mixer, HP Requirements, Chart	Applications	43
Banbury Mixers, Motor Applications	Applications	41-43
Bearing Maintenance	Installation & Maintenance	28
Bearings and Lubrication	Installation & Maintenance	16
Belted Type Induction Motors	Induction Motors	11
Blowers, Starting/Pull-In/Pull-Out Torques, NEMA Recommendations, Chart	Synchronous Motors	28
Boiler Feed Pump, Magnetic Drive Characteristics, Ampli-Speed, Diagram	Adjustable Speed	12
Boiler Feed Pumps, Application, Ampli-Speed	Adjustable Speed	11
Boiler Feed Pumps, Auxiliary Motors, Applications	Applications	32
Bracket Bearing Induction Motors	Induction Motors	11
Bracket-Type Generators	Eng. Driven Generators	14
Breakdown Torque	Induction Motors	7
Breakdown Torque, Formula	Induction Motors	7
Brush Performance	Installation & Maintenance	25
Brush Type Field Control for Synchronous Motors	Motor Controls	40-41
Brushless Field Control for Synchronous Motors	Motor Controls	42-45
CAGE-TROL	Motor Controls	12
Capacitance	Power Factor	6
Capacitance Measured in Farads, Formula	Power Factor	6
Capacitive Reactance, Formula	AC Mtrs & Cntrls: Fundamentals	7
Capacitive Reactance, Formula	Eng. Driven Generators	4
Capacitor Start, Starting	Motor Starting: I & M	31
Capacity Control, High Interrupting	Induction Motors	27

TOPIC	BOOK SUBJECT	PAGE
Capacity Control, Standard Interrupting	Induction Motors	27
Capacity Curve, Diagram	Eng. Driven Generators	9
CCF Motors, Classifications	P-Type Motors	6
Cement Plant Drives, Application, Ampli-Speed	Adjustable Speed	38-39
Cement Processing, Motor Applications	Applications	54
Centrifugal Compressors, Application, Ampli-Speed	Adjustable Speed	13
Centrifugal Compressors, Applications	Applications	17-19
Centrifugal Compressors, Torques, NEMA Recommendations, Chart	Applications	19
Centrifugal Pump, Magnetic Drive Characteristics, Ampli-Speed, Diagram	Adjustable Speed	10
Centrifugal Pumps, Motor Applications	Applications	20
Centrifugal Pumps, Variable-Torque Loads, Ampli-Speed	Adjustable Speed	9
Change of Existing Motors	Installation & Maintenance	8
Characteristics of P Type Motor Protection	P-Type Motors	5
Chart, Wound Rotor Motor, Starting Currents at Various Steps of External Resistance in Secondary Circuit	AC Mtrs & Cntrls: Fundamentals	46
Checking Up, Motor Control	Installation & Maintenance	9
Chipping 1 Cord of Wood, HP Hours Required, Chart	Applications	52
Circuit Conditions Using Correction by Leading P.F. Synchronous Motor	Power Factor	16
Class A (105°C) Insulation	AC Motors & Controls: Fundamentals	10
Class A (105°C) Insulation	Induction Motors	10
Class B (130°C) Insulation	AC Mtrs & Cntrls: Fundamentals	11
Class B (130°C) Insulation	Induction Motors	10
Class F (155°C) Insulation	AC Mtrs & Cntrls: Fundamentals	11
Class F (155°C) Insulation	Induction Motors	10
Class H (180°C) Insulation	AC Mtrs & Cntrls: Fundamentals	11
Class H (180°C) Insulation	Induction Motors	10
Code Letter - KVA/HP at Locked Rotor, Full Voltage, Chart	Installation & Maintenance	9
Coil Insulation, Void Free	Insulation	17-23
Coil Insulation, Effects of Temperature	Insulation	11
Coil Insulation, Evaluation Tests	Insulation	11
Coils & Windings of AC Machines, Factory Tests	Insulation	36-39
Collector Ring Polarity Reversal	Installation & Maintenance	26
Combustion Control - Boiler Draft Fans, Application, Ampli-Speed	Adjustable Speed	10
Common Code Letters & SKVA/HP, Chart	Motor Starting: I & M	11
Common Induction Motor Synchronous Speeds, Chart	Induction Motors	8
Commutation Done by Using Open Circuited Winding, Diagram	Synchronous Motors	32
Comparison of IEC and NEC Requirements for P-Type Motors	P-Type Motors	19
Comparison of IEC/EN & NEC/NFPA Requirements for P-Type Motors, Chart	P-Type Motors	18
Comparison of Standards Between Major Countries, Chart	P-Type Motors	25
Comparison of the Degree of Protection Between IEC & NEMA, Chart	P-Type Motors	23
Comparisons of Standards Between Major Countries	P-Type Motors	25
Composite Insulations	Insulation	10-11
Compressors and Vacuum Pumps, Motor Applications	Applications	10-19
Compressors, Starting/Pull-In/Pull-Out Torques, NEMA Recommendations, Chart	Synchronous Motors	27

TOPIC	BOOK SUBJECT	PAGE
Compressors, Synchronous Motor Applications	Synchronous Motors	25
Condensate & Circulating Water Pumps, Application, Ampli-Speed	Adjustable Speed	11
Condensate Pumps, Auxiliary Motors, Applications	Applications	32
Conditions in Motor when Operating in Synchronism & at No Load, Diagram	Synchronous Motors	17
Conditions in Synchronous Motor When Operating in Synchronism at No Load, Diagram	AC Mtrs & Cntrls: Fundamentals	27
Conduction Effect	Insulation	7
Connections in Typical Purge Test, Diagram	P-Type Motors	13
Connections on the Voltage Regulator to Obtain Cross-Current Compensation, Diagram	Eng. Driven Generators	19
Constant-HP Loads, Ampli-Speed	Adjustable Speed	10
Constant-Torque Load, Magnetic Drive Characteristics, Ampli-Speed, Diagram	Adjustable Speed	11
Constant-Torque Loads, Ampli-Speed	Adjustable Speed	10
Construction Features	Induction Motors	16, 17
Continuous Circulation	P-Type Motors	5
Continuous Loads, Ampli-Speed	Adjustable Speed	9
Control Centers, Induction Motors	Motor Controls	11
Control Enclosures	Motor Controls	34
Control Unit	P-Type Motors	9
Controller, Ampli-Speed	Adjustable Speed	14
Cooling Water Pumps, Auxiliary Motors, Applications	Applications	32
Cooling Water Requirements per KW Loss for Ambient Water Temp., Diagram	AC Mtrs & Cntrls: Fundamentals	13
Corona Effect	Insulation	9
Corona In Rotating Machinery	Insulation	26-35
Corona In Rotating Machinery, Cause Of	Insulation	27-30
Corona In Rotating Machinery, Endurance Testing	Insulation	30-32
Corona In Rotating Machinery, Measuring Methods	Insulation	32-35
Correcting Power Factor	Power Factor	12
Correcting Power Factor With Synchronous Motors	Power Factor	14
Coupled Type Induction Motors	Induction Motors	11
Crank Effort for 1 Cyl/DbI Act & 2 Cyn/Sngl Act Compressors, Diagram	Synchronous Motors	26
Crank Effort for 2 Cyl/DbI Act & 4 Cyn/Sngl Act Compressors, Diagram	Synchronous Motors	27
Crushers, Synchronous Motor Applications	Synchronous Motors	29
Current Frequency in Field Windings as Motor Gets To Speed, Diagram	Synchronous Motors	16
Current Limiting Protection, High Interrupting Capacity	Motor Controls	24-25
Current & Voltage Relationships in a Shunt Circuit, Diagram	Power Factor	9
Current & Voltage Relationships in a Series A-C Circuit, Diagram	Power Factor	7
Current vs Speed Curve in Starting AC Motor, Diagram	Motor Starting: I & M	6
Currents & Mag. Fields of 2-Pole Induction Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	37
Curves, Percent Torque to Percent Synchronous Speed, Diagram	AC Mtrs & Cntrls: Fundamentals	24
Curves Showing HP, Speed, & WK ² for Synchronous Motors, Diagram	Synchronous Motors	15
Cyclic Load Considerations, Applications	Applications	8
Cyclic Loads, Ampli-Speed	Adjustable Speed	8
DC Excitation - Synchronizing of Motor, Diagram	Synchronous Motors	16
DC Power Circuit, Diagram	Motor Starting: I & M	13

TOPIC	BOOK SUBJECT	PAGE
DC Power, Formula	Motor Starting: I & M	11
Deep-Bar Rotor, Induction Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	39
Definitions and Formulae	AC Mtrs & Cntrls: Fundamentals	6
Degree of Cooling (IC Code)	P-Type Motors	23
Degree of Protection (IP Code)	P-Type Motors	23
Delta Connection	Eng. Driven Generators	6
Delta Connection, Diagram	Eng. Driven Generators	7
Diagram, Leading Reactive KVA in % of Motor HP	Synchronous Motors	9
Dielectric Coefficients	Insulation	10
Dielectric Coefficients for Insulating Materials, Chart	Insulation	10
Dielectrics, Characteristics of	Insulation	6
Dielectrics, The Fundamental Elements of Insulation	Insulation	4
Differential Protection Using "Self-Balanced" System, Diagram	Motor Controls	30
Direct Current Component	Eng. Driven Generators	12
Dissipation of Heat (Watts/Sq. In.) From Motor at Various Air Velocities, Diagram	AC Mtrs & Cntrls: Fundamentals	12
Double Cage Torque Curves, Diagram	AC Mtrs & Cntrls: Fundamentals	24
Double Cage Torque, Diagram	Synchronous Motors	11
Double Cage & Deep-Bar Rotors, Induction Motors	Induction Motors	14
Double Cage Rotor, Induction Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	39
Draft Fan Control, HP Output for Various Types, Ampli-Speed, Diagram	Adjustable Speed	11
Drip-Proof Induction Motors	Induction Motors	10
Drives, Special & Other, Auxiliary Motors, Applications	Applications	34
Duct Size and Pressure Drop Relationships, Diagram	AC Mtrs & Cntrls: Fundamentals	13
Dust Classifications, IEC & NEC/NFPA, Chart	P-Type Motors	21
Dynamic Braking, Synchronous Motor Controls	Motor Controls	7
EEx Suffixes, Codes, Descriptions, Plus IEC/EN & NEC Applications, Chart	P-Type Motors	22
Effect of Capacitance on Voltage & Current, Diagram	Power Factor	7
Effect of Field Discharge Resistance to Field Winding Resistance, Diagram	AC Mtrs & Cntrls: Fundamentals	26
Effect of Inductance on Voltage & Current, Diagram	Power Factor	7
Effect of Lagging Power Factor on A-C Equipment, Diagram	Power Factor	11
Effect of Power Factor and Applied Load, Starting	Motor Starting: I & M	30
Effect of Voltage on Power Factor, Chart	Induction Motors	6
Effect on Initial Load, Starting	Motor Starting: I & M	25
Effect of Voltage On Efficiency, Induction Motors, Chart	Induction Motors	9
Effective Impedance Triangle for Shunt Capacitor Starting, Diagram	Motor Starting: I & M	18
Efficiency Losses, Induction Motor, Formula	Induction Motors	8
Efficiency of Induction Motors, Diagram	Induction Motors	8
Electric Currents & Magnetic Fields in Stator of 3-Phase Squirrel Cage Motor, Diagram	Induction Motors	13
Electrical Characteristics of AC Generators	Eng. Driven Generators	8
Electrical Connections	Installation & Maintenance	19
Elements of Motor Controls	Motor Controls	4-5
EM Design "X" Squirrel-Cage Motors	Induction Motors	19
Enclosure Comparison Between IEC & NEMA, Chart	P-Type Motors	23

TOPIC	BOOK SUBJECT	PAGE
Enclosure Designs for P-Type Motors	P-Type Motors	16
Enclosures, Grouped Controls, Stress Cones	Motor Controls	34-35
Energy Absorbed in Accelerating a Rotating Mass, Formula	Synchronous Motors	13
Engine-Type Generators	Eng. Driven Generators	14
Engine-Type Generators, Description/App/Specs, Chart	Eng. Driven Generators	20
Equipment that Requires Reactive KVA, Diagram	Power Factor	19
Equipment that Supplies Reactive KVA, Diagram	Power Factor	19
European Test Institutions, Authorized, Chart	P-Type Motors	26
Ex p Motor Protection Systems	P-Type Motors	6
Ex p Protection Methods	P-Type Motors	5
Examples of Duct Arrangements	Installation & Maintenance	6
Excitation Changes, How They Vary Power Factors, Diagram	AC Mtrs & Cntrls: Fundamentals	21
Exciter Connection, Diagram	Installation & Maintenance	20
Exciter & Rotor Testing, Insulation	Insulation	53
Exciter/Rotating Heat Sink/Synchronous Motor Circuit, Diagram	Synchronous Motors	23
Explosion Protection, Methods of	P-Type Motors	22
Fan Load, Magnetic Drive Characteristics, Ampli-Speed, Chart	Adjustable Speed	9
Fans, Application, Ampli-Speed	Adjustable Speed	13
Field Discharge Resistance to Field Resistance Ratios, Diagram	Synchronous Motors	12
Field Forcing, Starting	Motor Starting: I & M	30-31
Field Windings, Torque	Synchronous Motors	12
Filters	Installation & Maintenance	5
Flanged-Mounted Induction Motors	Induction Motors	11
Flywheel Effect	Eng. Driven Generators	11
Flywheel Effect, Formula	Synchronous Motors	27
Flywheel Requirements, Determining, X-Y Curve, Diagram	Synchronous Motors	27
Forced Draft Fans, Auxiliary Motors, Applications	Applications	32-34
Frequency Changers & Stabilizers, Application, Ampli-Speed	Adjustable Speed	13
Frequency Limitations in Starting	Installation & Maintenance	34
Frequency of Current Induced in Field Winding During Starting, Diagram	AC Mtrs & Cntrls: Fundamentals	27
Full Load Amperes of 3-Phase Motors, Chart	Motor Controls	15
Full Load Drop	Motor Starting: I & M	16-17
Full Load Excitation	Eng. Driven Generators	8
Full Voltage Induction Motor Starting, Chart	Induction Motors	21
Full Voltage Starters, Adjustable-Speed Magnetic Drive, Induction Motor Control	Induction Motors	26
Full Voltage Starting, Diagram	Motor Starting: I & M	8
Full Voltage Starting Inrush Factors for AC Motors, Chart	Motor Controls	14
Full Voltage Starting with Disconnect Methods & Short-Circuit Protection, Diagram	Motor Controls	5
Full-Load Speed & Slip	Induction Motors	8
Full-Load Torque, Formula	Induction Motors	7
Full-Voltage/Autotransformer/Reactor, Diagram	Synchronous Motors	20
Fundamentals of Magnetic Drive	Adjustable Speed	4
Gas & Vapor Classifications, Chart	P-Type Motors	18

TOPIC	BOOK SUBJECT	PAGE
Gas & Vapor Classifications, IEC/CENELEC, IEC/EN, & NEC/NFPA, Chart	P-Type Motors	21
General Advantages	Synchronous Motors	2-3
Generator Conditions Operating Under No Load, Diagram	Eng. Driven Generators	10
Generator Definitions	Eng. Driven Generators	4
Generator Formulas	Eng. Driven Generators	4
Generator Reactances Table, Chart	Eng. Driven Generators	11
Generator Standards & Accessories	Eng. Driven Generators	14
Generator Symbols	Eng. Driven Generators	4
Generator Voltage Dip for Various Excitation & Regulation Systems, Diagram	Motor Starting: I & M	26
Generator Voltage Dip & Recovery During Starting, Diagram	Motor Starting: I & M	21
Generator Voltage Dip with Initial Constant Current Load, Diagram	Motor Starting: I & M	27
Generator Voltage Dip with Initial Load of Loaded Motors, Diagram	Motor Starting: I & M	28
Graphic Method for Power Factor Calculations, Diagram	AC Mtrs & Cntrls: Fundamentals	32
Graphic Method for Power Factor Calculations, Diagram	Power Factor	21
Grease Specifications, Below 5000 rpm, Chart	Installation & Maintenance	32
Grinders, Synchronous Motor Applications	Synchronous Motors	29
Ground Fault Protection	Motor Controls	29
Ground Fault Protection, Diagram	Motor Controls	29
Group Controls	Induction Motors	27
Grouped Controls	Motor Controls	34
Harmonics	Eng. Driven Generators	12
Harmonics, Connection & Grounded, Chart	Eng. Driven Generators	12
Hazardous Group Designations, Chart	P-Type Motors	20
Hazardous Location Considerations, Applications	Applications	8
Hazardous Locations, Classifications	P-Type Motors	20
Heat Run	P-Type Motors	14
Heat Run Loading Practices	Insulation	43-45
Heavy-Duty Induction Squirrel-Cage Motor, Diagram	Induction Motors	16
Henries, Inductance Measured in, Formula	Power Factor	6
High Interrupting Capacity, Current Limiting Protection	Motor Controls	24-25
High Voltage Controls, Short-Circuit Protection	Motor Controls	22-23
High Voltage Insulation	Insulation	25
High Voltage Magnetic Induction Motor Control	Motor Controls	13
High Voltage Magnetic Synchronous Motor Control	Motor Controls	9
High Voltage Switchgear Specifications, Generator	Eng. Driven Generators	25
High Voltage Synchronous Motor Control	Motor Controls	49
Horizontal Ampli-Speed Magnetic Drives, Diagram	Adjustable Speed	6
Horsepower Determination, Induction Motors	Induction Motors	9
Horsepower Determination, Induction Motors, Formula	Induction Motors	9
How a Synchronous Motor Operates, Diagram	AC Mtrs & Cntrls: Fundamentals	19
How Change of Excitation Varies Power Factor, Diagram	Power Factor	15
How Power Factor Can be Improved with Synchronous Motors & Capacitors, Diagram	Power Factor	13
HP vs Volts, Minimum Recommended Motor Ratings, Chart	Applications	5

TOPIC	BOOK SUBJECT	PAGE
IC Code Demonstration, Chart	P-Type Motors	24
IC & IP Codes of NEMA Enclosures, Chart	P-Type Motors	16
IEC Ingress Protection Code (IP Code), Chart	P-Type Motors	23
Impedance	Power Factor	6
Impedance, Formula	AC Mtrs & Cntrls: Fundamentals	7
Impedance, Formula	Eng. Driven Generators	4
Impedance, Formula	Induction Motors	5
Impedance, Formula	Power Factor	6
Impedance Triangle, Diagram	Motor Starting: I & M	13
Incher Control for Synchronous Motors	Motor Controls	47
Incher Control, Motor Applications	Applications	54
Induced Draft Fans, Auxiliary Motors, Applications	Applications	32
Inductance	Power Factor	6
Inductance Measured in Henries, Formula	Power Factor	6
Induction Motor Controls	Motor Controls	10-13
Induction Motor Efficiency Losses, Formula	Induction Motors	8
Induction Motor Starting (Open Transition), Chart	Induction Motors	21
Induction Motor Torque Varies with Resistance & Reactance of Cage Bars, Diagram	Induction Motors	14
Induction Motors	AC Mtrs & Cntrls: Fundamentals	36
Induction Motors, How They Operate	Induction Motors	12
Inductive Reactance, Formula	AC Mtrs & Cntrls: Fundamentals	7
Inductive Reactance, Formula	Eng. Driven Generators	4
Inductive Reactance, Formula	Induction Motors	5
Industrial Pumping, Application, Ampli-Speed	Adjustable Speed	13
Inertia Factors for Different Load Applications, Chart	Synchronous Motors	15
Initial Operation	Installation & Maintenance	13
Initial Voltage Boost, Starting	Motor Starting: I & M	31
Installation and Alignment	Installation & Maintenance	10
Instantaneous Voltage, Current & Power for Unity, Leading & Lagging Power Factors, Diagram	Synchronous Motors	7
Insulation, AC Generators	Eng. Driven Generators	14
Insulation and Temperature Rise	AC Mtrs & Cntrls: Fundamentals	10
Insulation and Temperature Rise	Induction Motors	9
Insulation Degradation, Formula	Insulation	41
Insulation Deterioration, Causes	Insulation	46-49
Insulation Maintenance	Installation & Maintenance	27
Insulation Maintenance	Insulation	46-53
Insulation Performance Standards	Insulation	54-59
Interlocked By-Pass & LCI Contactor for 2-Motor Applications, Diagram	Synchronous Motors	35
International Standards	P-Type Motors	18
International Standards, Zone 0	P-Type Motors	19
International Standards, Zone 1	P-Type Motors	19
International Standards, Zone 2	P-Type Motors	19

TOPIC	BOOK SUBJECT	PAGE
Interrupting Capacity, Short-Circuit Protection	Motor Controls	20-23
Interrupting-Capacity, Generator	Eng. Driven Generators	26
Inverse Time Element, Thermal Overload Relay	Motor Controls	28
Inverter Windings, 6 Pulse Single & 12 Pulse Dual, Diagram	Synchronous Motors	33
Ionization Effect	Insulation	9
Kilowatt	Eng. Driven Generators	5
KVA Margin as Basis of Stability	Eng. Driven Generators	9
KVA & Starting Torque Curves, Diagram	AC Mtrs & Cntrls: Fundamentals	24
KVA Triangle for Shunt Capacitor Starting, Diagram	Motor Starting: I & M	18
KVAR, Leading, Lagging, Diagram	Synchronous Motors	8
Large HP Motors, Torque, KVA & Slip Characteristics, Chart	Applications	50
LCA and LCF Systems	P-Type Motors	8
LCA, Sequence of Operation	P-Type Motors	8
LCA, Sequence of Operation, Pressurization Sequence	P-Type Motors	8
LCA, Sequence of Operation, Purge Sequence	P-Type Motors	8
LCA System	P-Type Motors	8
LCF Component Description	P-Type Motors	11
LCF, Sequence of Operation	P-Type Motors	11
LCF, Sequence of Operation, Chart	P-Type Motors	11
LCF System	P-Type Motors	10
LCI, 12 Pulse, Diagram	Synchronous Motors	33
LCI, 6 Pulse, Diagram	Synchronous Motors	33
Leading Power Factor Motor in Terminal Voltage Application, Diagram	Synchronous Motors	7
Leading Reactive KVA in % of Motor HP for Synchronous Motors at Part Load & at Various Power Factor Ratings, Diagram	Power Factor	16
Leading Reactive KVA in % of Motor HP, Diagram	AC Mtrs & Cntrls: Fundamentals	31
Leakage Compensation	P-Type Motors	5
Lightning, Surge Protection	Motor Controls	36-37
Load Angle as Measure of Stability	Eng. Driven Generators	10
Load Angle, Diagram	Eng. Driven Generators	9
Load Characteristics, Ampli-Speed	Adjustable Speed	8-10
Load Commutated Variable Freq. Drive (6-pulse), Diagram	Synchronous Motors	31
Load, HP, RPM, Inertia, Slip, Load Torque & Pull-In Torque for Different Applications, Chart	Synchronous Motors	16
Load Inertia	AC Mtrs & Cntrls: Fundamentals	23
Load Inertia	Synchronous Motors	14
Load Inertia & Minimum Slip for Pulling Into Step, Diagram	Synchronous Motors	14
Load & "Nominal" Pull-In Torque Relationships, Diagram	Synchronous Motors	15
Locked-Rotor Torque	Induction Motors	7
Low Transient Reactance, Starting	Motor Starting: I & M	30
Low Voltage Controls, Short-Circuit Protection	Motor Controls	22
Low Voltage Magnetic Induction Motor Control	Motor Controls	12
Low Voltage Magnetic Synchronous Motor Control	Motor Controls	8

TOPIC	BOOK SUBJECT	PAGE
Low Voltage Switchgear Specifications, Generator	Eng. Driven Generators	24
Low Voltage Synchronous Motor Control	Motor Controls	48
Lubrication—Relation to Other Machines	Installation & Maintenance	8
Magnetic Drive Characteristics for Constant Torque Load, Diagram	AC Mtrs & Cntrls: Fundamentals	49
Magnetic Drive Characteristics for Fan Load, Diagram	AC Mtrs & Cntrls: Fundamentals	49
Magnetic Field Interaction Transmits Torque, Diagram	Adjustable Speed	5
Magnetic Flux Paths for 4-Pole Induction Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	38
Magnetizing Current	Eng. Driven Generators	5
Max. Surface Temp. Classifications, IEC/NEC, Chart	P-Type Motors	20
Mechanical Considerations	AC Mtrs & Cntrls: Fundamentals	12
Mechanical Constructions	Induction Motors	11
Mechanical Work Analogy of Power Factor, Diagram	Power Factor	5
Mercury Thermometers, Error Factor, Formula	Insulation	42
Meters, Generator	Eng. Driven Generators	27
Meters & Relays	Motor Controls	32-33
Methods of Starting	Induction Motors	21
Mica	Insulation	12-15
Mill Drives, Breakdown & Cracker, Motor Applications	Applications	40-41
Mill Drives, HP Requirements, Chart	Applications	43
Mills & Pulverizers, NEMA Recommended Torques, Chart	Applications	35
Mills, Synchronous Motor Applications	Synchronous Motors	29
Minerals Processing, Motor Applications	Applications	54-59
Motor Control Centers	Induction Motors	27
Motor Differential Protection	Motor Controls	30
Motor Enclosures, Ventilation, Diagram	AC Mtrs & Cntrls: Fundamentals	14-16
Motor Frame Diameter to Air Pressure Drop Relationships, Diagram	AC Mtrs & Cntrls: Fundamentals	13
Motor Generator Set Drives, Application, Ampli-Speed	Adjustable Speed	36-37
Motor Heat Loss to Temp. Rise of Cooling Air, Formula	AC Mtrs & Cntrls: Fundamentals	13
Motor & Load Torques for Cent. Fan - Motor Accel. Time, Chart	Synchronous Motors	13
Motor & Load Torques for Cent. Fan - Motor Accel. Timed, Diagram	Synchronous Motors	13
Motor & Load Torques for Centrifugal Fan, Diagram	AC Mtrs & Cntrls: Fundamentals	28
Motor Plus Load Inertia to Max. Slip Ratio to Pull Motor Into Step, Formula	AC Mtrs & Cntrls: Fundamentals	24
Motor Protection Coordination, Diagram	Motor Controls	25
Motor Recommendations, Mineral Processing Applications	Applications	56
Motor Regenerative Voltage	Motor Controls	31
Motor Starting Characteristics	Motor Controls	18-19
Motor Starting Methods	Motor Controls	14-15
Motor Starting Types, Characteristics In Percent Of Rated Starting Values, Chart	Motor Controls	16-17
Motor Thermal Capacity, Changes at Different Altitudes & Temperatures, Chart	Applications	6
Motor Types, Engine/Flange/Bracket Bearing/Pedestal/Vertical/Drip Proof	AC Mtrs & Cntrls: Fundamentals	17
Motor-Generator Sets, Applications	Applications	26-31
Motor-Generator Sets, High Frequency, Characteristics, Chart	Applications	29

TOPIC	BOOK SUBJECT	PAGE
Motor-Generator Sets, NEMA Recommended Torques, Chart	Applications	31
Multi-Speed Squirrel-Cage Motors	Induction Motors	22
Multispeed, Across-the-Line Starters, Adjustable-Speed Magnetic Drive	Induction Motors	26
Multispeed Induction Motor Control	Motor Controls	11
Muscovite	Insulation	13
National Standards	P-Type Motors	19
Natural Frequency, Formula	AC Mtrs & Cntrls: Fundamentals	28
Natural Frequency - Oscillation, Formula	Synchronous Motors	26
Negative Phase Sequence Reactance	Eng. Driven Generators	12
NEMA Design B and EM Design "X" Torque & KVA Characteristic Comparisons, Diagram	Induction Motors	19
NEMA Design B, C & D Motor Torque Curves, Diagram	Induction Motors	18
NEMA Design B Squirrel-Cage Motors	Induction Motors	18
NEMA Design C Squirrel-Cage Motors	Induction Motors	18
NEMA Design D Squirrel-Cage Motors	Induction Motors	18
NEMA-MG 50-14	Induction Motors	10
NEMA-MG 50-16	Induction Motors	10
NEMA-MG 50-40	Induction Motors	10
Net Accelerating Torque, Formula	Synchronous Motors	12
Normal Load WK^2 Values, Formula	Synchronous Motors	14
Normal WK^2 of Load at Various HP and RPM, Chart	AC Mtrs & Cntrls: Fundamentals	25
Ohms Law, Formula	Power Factor	4
One-Line Representation of 3-Phase System with Motor Load, Diagram	Motor Starting: I & M	14
Open Circuit Excitation	Eng. Driven Generators	8
Open Type Motor, Induction Motors	Induction Motors	10
Oscillogram of Stator Current & Field Discharge Current Near Pull-In, Diagram	AC Mtrs & Cntrls: Fundamentals	27
Oscillogram of Synchronous Motor Driving Recip. Comp., Diagram	Synchronous Motors	26
Out-Of-Step Protection	Motor Controls	29
Over-Pressure Testing	P-Type Motors	12
Overhung-Type Induction Motors	Induction Motors	11
Overload Protection	Motor Controls	28-31
Overload Relay Connections in Motor Control Circuit, Diagram	Motor Controls	28
Overpotential Testing, Insulation	Insulation	51
P-Type Motor Equipped with an LCA System, Typical Arrangement, Diagram	P-Type Motors	8
P-Type Motor Protection	P-Type Motors	4
P-Type Synchronous Motor in Reciprocating, Compressor Application, Zone 2 Hazardous Area, Diagram	P-Type Motors	15
Packaged Generators	Eng. Driven Generators	14-15
Packaged Generators, Description/App/Specs, Chart	Eng. Driven Generators	20
PAKTROL 180 Starting Control	Motor Controls	49
PAKTROL Starting Control	Motor Controls	48
Paper Mill Drives, Application, Ampli-Speed	Adjustable Speed	32-33
Parallel Operation	Eng. Driven Generators	11
Parallel Operation & Cross-Current Compensation	Eng. Driven Generators	18

TOPIC	BOOK SUBJECT	PAGE
Parallel-Star Coil Connection, Diagram	AC Mtrs & Cntrls: Fundamentals	43
Parallel-Star (High-Speed) Coil Connection, Diagram	Induction Motors	22
Part Load Correction, Synchronous Motor	Power Factor	14
Part Winding Induction Motor Starting, Chart	Induction Motors	21
Part Winding Starting, Diagram	Motor Starting: I & M	8
Pedestal Bearing Induction Motors	Induction Motors	11
Pedestal-Type Generators	Eng. Driven Generators	14
Percent Starting & Pull-In Torques - Starting KVA, Chart	Synchronous Motors	20
Petroleum & Chemicals, Motor Applications	Applications	36-39
PFR System	Motor Controls	40-41
Phase Rotation, Induction Motors	AC Mtrs & Cntrls: Fundamentals	36
Plant Loading & Power Factor, Chart	Synchronous Motors	8
Polarization Effect	Insulation	9
Polarization Index Testing, Insulation	Insulation	51
Potier Reactance vs Voltage, Diagram	Insulation	44
Power Circuit, AC Single Phase, Diagram	Motor Starting: I & M	14
Power, Electric Load, Formula	Power Factor	4
Power Factor, V Curves	Synchronous Motors	8
Power Factor	Eng. Driven Generators	5
Power Factor, AC Circuits, Formula	AC Mtrs & Cntrls: Fundamentals	8
Power Factor & Magnetizing Current	Induction Motors	6
Power Factor Angles	Synchronous Motors	6-8
Power Factor at Excitation Value - Ratio of Line Amperes at Load to Line Amperes at Excitation, Diagram	AC Mtrs & Cntrls: Fundamentals	21
Power Factor at Given Excitation Values, Diagram	Synchronous Motors	8
Power Factor Billing	Power Factor	12
Power Factor Control	AC Mtrs & Cntrls: Fundamentals	20
Power Factor Correction	Synchronous Motors	9
Power Factor Correction by Capacitor	Power Factor	18
Power Factor, Correction by Synchronous Motors	AC Mtrs & Cntrls: Fundamentals	30
Power Factor Correction, KW and KVAR in Feeder Circuits, Diagram	Power Factor	17
Power Factor Data, Graphic Solution	Power Factor	20
Power Factor Data, Tangent Table Solution	Power Factor	20-22
Power Factor, DC Circuits, Formula	AC Mtrs & Cntrls: Fundamentals	7
Power Factor, Lagging & Leading, Formulae	Synchronous Motors	9
Power Factor Measurement	Power Factor	10
Power Factor of Induction Motors, Diagram	Induction Motors	7
Power Factor Testing, Insulation	Insulation	53
Power Factor/Ratio KVAR/kW, Chart	Synchronous Motors	9
Power Factors, Controlling Influences	Synchronous Motors	6-9
Power, Formula	Eng. Driven Generators	4
Power, Formula	Induction Motors	5
Power, Formula	Power Factor	4

TOPIC	BOOK SUBJECT	PAGE
Power Plant Auxiliary Motors	Applications	32-35
Power Plant Drives, Boiler Draft Fans, Application, Ampli-Speed	Adjustable Speed	28-31
Power Requirements, 1- & 2-Stage Compressors, Chart	Applications	11
Power Utilization	Motor Starting: I & M	11
Precautions for Open Motors	Installation & Maintenance	7
Pressurization Techniques	P-Type Motors	5
Protection, Ground Fault	Motor Controls	29
Protection, Motor Differential	Motor Controls	30
Protection, Out-Of-Step	Motor Controls	29
Protection, Single Phase	Motor Controls	30
Protection Unit	P-Type Motors	10
Protection, Voltage Dip	Motor Controls	31
Protective Constructions	Induction Motors	10
Protective Constructions, Induction Motors	Induction Motors	10
Protective Enclosures	AC Mtrs & Cntrls: Fundamentals	12
Pull-In	AC Mtrs & Cntrls: Fundamentals	24
Pull-In Torque, Nominal	AC Mtrs & Cntrls: Fundamentals	24
Pull-Out Torque	AC Mtrs & Cntrls: Fundamentals	28
Pull-Out Torque, Diagram	Synchronous Motors	18
Pulp & Paper, Motor Applications	Applications	46-53
Pulp & Paper Mill Loads, Synchronous Motor Characteristics, Chart	Applications	51
Pulp & Paper Mills, Synchronous Motor Applications	Synchronous Motors	29
Pulp & Paper, Starting/Pull-In/Pull-Out Torques, NEMA Recommendations, Chart	Synchronous Motors	29
Pulsations in Total Torque, Diagram	Synchronous Motors	19
Pulverizers & Exhausters, Auxiliary Motors, Applications	Applications	34
Pump Torques, NEMA Recommendations, Chart	Applications	24
Pumps, Centrifugal, Application	Synchronous Motors	28
Pumps, Motor Applications	Applications	20
Pumps, Pressure Differences, Formula	Synchronous Motors	28
Pumps, Starting/Pull-In/Pull-Out Torques, NEMA Recommendations, Chart	Synchronous Motors	29
Purge Air Supply	P-Type Motors	10
Purge Medium	P-Type Motors	6
Purge Methods	P-Type Motors	5
Purge Test	P-Type Motors	13
Purge Test, Test Criteria	P-Type Motors	13
Purge Test, Test Method	P-Type Motors	13
Ratio of Out-Of-Phase to In-Phase Component of Current In 3-Phase Service, Formula	Eng. Driven Generators	5
Reactances	Eng. Driven Generators	11
Reactive KVA	Eng. Driven Generators	5
Reactive KVA at Known Load & Power Factor, Formula	Power Factor	14
Reactive KVA, Formula	AC Mtrs & Cntrls: Fundamentals	9
Reactor Induction Motor Starting, Chart	Induction Motors	21
Reactor Starting, Diagram	Motor Starting: I & M	9

TOPIC	BOOK SUBJECT	PAGE
Reciprocating Compressors, Applications	Applications	10-13
Reciprocating Compressors, Torques, NEMA Recommendations, Chart	Applications	11
Reciprocating Pumps, Motor Applications	Applications	24
Recovery Voltage for Generators with Rotating Exciters & Mechanical Regulators, Diagram	Motor Starting: I & M	29
Recovery Voltage for Generators with Static Regulators & High Speed Excitation, Diagram	Motor Starting: I & M	29
Reduced KVA Starting	Induction Motors	20
Reduced KVA Starting, Adjustable-Speed Magnetic Drive	Induction Motors	26
Reduced Voltage Starting	Motor Starting: I & M	9
Reduced-KVA Starting, Induction Motors	Induction Motors	20
References	P-Type Motors	27
Regenerative Voltages	AC Mtrs & Cntrls: Fundamentals	50
Regenerative Voltages, Cumulative Phase Angle/Cycles, Diagram	AC Mtrs & Cntrls: Fundamentals	51
Regenerative Voltages, Time/Percent Rated RPM & Volts, Diagram	AC Mtrs & Cntrls: Fundamentals	51
Regenerative Voltages, Typical Circuit with Normal & Alternative Power Sources, Diagram	AC Mtrs & Cntrls: Fundamentals	50
Regulation	Eng. Driven Generators	8
Relation of Load Torque & "Nominal" Pull-In Torque for Fan & Pump Drives, Diagram	AC Mtrs & Cntrls: Fundamentals	27
Relays & Meters	Motor Controls	32-33
Resistance, Change-to-Temperature, Formula	Insulation	42
Resistance, Formula	AC Mtrs & Cntrls: Fundamentals	7
Resistance, Formula	Eng. Driven Generators	4
Resistance, Formula	Induction Motors	5
Resistance Testing, Insulation	Insulation	50
Resistivity of Conductor Materials, Diagram	Insulation	5
Resistor Starting, Diagram	Motor Starting: I & M	9
Resonance	Power Factor	8
Resonance, Current & Voltage Oscillation at Given Frequency, Formula	Power Factor	8
Right Hand Rule	AC Mtrs & Cntrls: Fundamentals	9
Root Mean Square/Max Volts, Formula	Eng. Driven Generators	4
Rotary Compressors, Applications	Applications	14-16
Rotary Compressors, Torques, NEMA Recommendations, Chart	Applications	16
Rotary Pumps, Motor Applications	Applications	24
Rotating Magnetic Field	AC Mtrs & Cntrls: Fundamentals	18
Rotor Construction	Induction Motors	14-15
Rotor & Exciter Testing, Insulation	Insulation	53
Rotors for Squirrel-Cage Motors	Induction Motors	15
Rubber & Plastics, Motor Applications	Applications	40-45
Rubber Mill Motor Control	Motor Controls	47
Running Pressure Test	P-Type Motors	14
Safety Spark Gap	Installation & Maintenance	25
SAFUSE 180, Induction Motors	Motor Controls	13
SAFUSE 180 Motor Controls, Maximum HP Ratings, Chart	Motor Controls	24

TOPIC	BOOK SUBJECT	PAGE
SAFUSE 180, Synchronous Motors	Motor Controls	9
Saturation Curves of a 500 HP, 0.8 Leading Power Factor Synchronous Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	28
Saturation Curves of a Generator, Diagram	Eng. Driven Generators	9
SCR Firing Sequence for 6 & 12 Pulse Drives, Diagram	Synchronous Motors	33
Segregated Loss Method for Determining Synchronous Motor Efficiency	AC Mtrs & Cntrls: Fundamentals	29
Selection & Application of Generators	Eng. Driven Generators	16
Separate Starting Motor, Starting	Motor Starting: I & M	31
Series Capacitors	Motor Starting: I & M	18-19
Series-Delta Coil Connection, Diagram	AC Mtrs & Cntrls: Fundamentals	43
Series-Delta (Low-Speed) Coil Connection, Diagram	Induction Motors	22
Service Pumps, Auxiliary Motors, Applications	Applications	32
Setting Up, Motor Control	Installation & Maintenance	20
Sewage Pump Drives, Application, Ampli-Speed	Adjustable Speed	16-23
Shaft Current Considerations, Applications	Applications	9
Shaft Currents	Installation & Maintenance	18
Shaft Mounted Brushless Exciter, Diagram	Synchronous Motors	22
Short Circuit Component	Eng. Driven Generators	12
Short Circuit Current Drive	Eng. Driven Generators	12
Short Circuit Excitation	Eng. Driven Generators	8
Short Circuit Ratio	Eng. Driven Generators	8
Short Circuit Ratio, Effect of	Eng. Driven Generators	8
Short Circuit vs Time, Chart	Eng. Driven Generators	13
Short-Circuit Protection, Adjustable-Speed Magnetic Drive, Induction Motor Control	Induction Motors	26
Short-Circuit Protection, Interrupting Capacity	Motor Controls	20-23
Shunt Capacitors	Motor Starting: I & M	19-20
Shutdown	P-Type Motors	14
Significance of Low, Lagging Power Factor	Power Factor	10
Simultaneous Start, Starting	Motor Starting: I & M	31
Sine Wave Representation of Volts, Current & Watts at Various Phase Relationships Between Volts & Amperes, Diagram	Power Factor	9
Sine Wave Simulations of Var. Freq. Drive Output, Diagram	Synchronous Motors	34
Sine Wave/Harmonic, Chart	Eng. Driven Generators	13
Single & 3-Phase Generators, Diagram	Eng. Driven Generators	7
Single Phase Power, Formula	Motor Starting: I & M	11
Single Phase Protection	Motor Controls	30
Sintering Fans, NEMA Torque Recommendations, Chart	Applications	59
Sintering, Motor Applications	Applications	59
Slip Loss, Formula	Synchronous Motors	13
Slip Loss-Effective Work, Formula	Synchronous Motors	14
Slip Ring Induction Motors	Induction Motors	23
Slip Value From Which Motor Will Pull Into Step, Formula	Synchronous Motors	14
Space Heaters	Installation & Maintenance	8
Spare Parts Programming	Installation & Maintenance	23

TOPIC	BOOK SUBJECT	PAGE
Special Class A Insulation	Induction Motors	10
Speed & Starting Characteristics of Wound-Rotor Motors	Induction Motors	24-25
Speed-Torque Curve, Average Torque, Diagram	Synchronous Motors	19
Splash-Proof Induction Motors	Induction Motors	10
Squirrel Cage Designs, NEMA	AC Mtrs & Cntrls: Fundamentals	40
Squirrel Cage Motors, Normal WK^2 Values, NEMA Recommendations, Chart	AC Mtrs & Cntrls: Fundamentals	45
Squirrel Cage Torque Curves for Operation as Induction Motor & Induction Generator, Diagram	AC Mtrs & Cntrls: Fundamentals	38
Squirrel-Cage Motor Classifications	Induction Motors	18
Squirrel-Cage Motor Controls	Induction Motors	26-27
Squirrel-Cage Motor, High-Speed, 2-Pole, Diagram	Induction Motors	17
Stability	Eng. Driven Generators	8
Standard High-Speed Generators, Description/App/Specs, Chart	Eng. Driven Generators	20
Standard Voltages, Importance of	Eng. Driven Generators	9
Star Connection	Eng. Driven Generators	6
Star Connection, Diagram	Eng. Driven Generators	7
Star-Delta Induction Motor Starting, Chart	Induction Motors	21
Star-Delta Starting, Diagram	Motor Starting: I & M	9
Starting on Power Systems, General Considerations	Motor Starting: I & M	7
Starting, Applicable Formulae & Definitions	Motor Starting: I & M	11
Starting, Auto-Transformer (Closed Transition), Chart	Motor Controls	16
Starting, Auto-Transformer, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	19
Starting Current of Squirrel-Cage Motors	Induction Motors	19
Starting Duty Considerations, Applications	Applications	8-9
Starting & Excitation Methods	Synchronous Motors	20-23
Starting, Full Voltage, Chart	Motor Controls	16
Starting, Full Voltage, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	18
Starting KVA	Motor Starting: I & M	10
Starting Methods with Limited Capacity Generators	Motor Starting: I & M	30-31
Starting Methods with Power Systems	Motor Starting: I & M	8-10
Starting, Multispeed Consequent Pole Winding, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	19
Starting, Multispeed Separate Winding, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	19
Starting on Limited Capacity Generators, General Considerations	Motor Starting: I & M	24
Starting (Open Transition), Induction Motor, Chart	Induction Motors	21
Starting, Part-Winding, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	18
Starting, Part-Winding, Chart	Motor Controls	16
Starting, Reactor or Resistor, Chart	Motor Controls	16
Starting, Reactor or Resistor, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	18
Starting Torque & KVA of Wound-Rotor Induction Motors, Diagram	Induction Motors	25
Starting Torque & Starting KVA, Diagram	Synchronous Motors	10
Starting, Voltage Dip, Formula	Synchronous Motors	20
Starting, Wye-Delta, Chart	Motor Controls	16

TOPIC	BOOK SUBJECT	PAGE
Starting, Wye-Delta, Motor Primary Connections/Torque & KVA Curves, Diagram	Motor Controls	19
Static Excitation for Synchronous Motors	Motor Controls	38-39
Static Overpressure in a P-Type Motor While Running, Diagram	P-Type Motors	14
Static Regulation &/or Excitation, Starting	Motor Starting: I & M	30
Stator Current, Diagram	Synchronous Motors	16
Stator Fields	Synchronous Motors	4-5
Storage Precautions	Installation & Maintenance	10
Stress Cones	Motor Controls	35
Sub-Frequency Start, Starting	Motor Starting: I & M	31
Sub-Transient Reactance	Eng. Driven Generators	12
Surge Protection	Motor Controls	36-37
Switchgear, Generator	Eng. Driven Generators	22
SYNC-TROL	Motor Controls	8
SYNCHRO-PAC System	Motor Controls	42-45
SYNCHRONEX	Motor Controls	38-39
Synchronizing Power	Eng. Driven Generators	10
Synchronizing Power, Formula	AC Mtrs & Cntrls: Fundamentals	26
Synchronizing Power, Formula	Eng. Driven Generators	10-11
Synchronizing Power, Formula	Synchronous Motors	17
Synchronous & Induction Motor Applications by HP and RPM, Chart	Synchronous Motors	25
Synchronous Motor Controls	Motor Controls	6-9
Synchronous Motors	AC Mtrs & Cntrls: Fundamentals	18
Synchronous Reactance	Eng. Driven Generators	12
Synchronous Speed, Formula	AC Mtrs & Cntrls: Fundamentals	7
Synchronous Speed, Formula	Eng. Driven Generators	4
Synchronous Speed, Formula	Induction Motors	7
Synchronous Torque	AC Mtrs & Cntrls: Fundamentals	26
System Impedance Triangle for Shunt Capacitor Starting, Diagram	Motor Starting: I & M	18
System Resistance & Fan Head Characteristics, Diagram	Synchronous Motors	30
Systematic Maintenance	Installation & Maintenance	21
Taconite, Motor Applications	Applications	57-59
TEAAC	P-Type Motors	17
TEFC Induction Motors	Induction Motors	11
TEFV	P-Type Motors	16
TEFV, TEAAC & TEWAC Enclosure Designs, Diagram	P-Type Motors	17
TEIGF Induction Motors	Induction Motors	11
Telephone Influence Factor	Eng. Driven Generators	12
Telephone Influence Factor Curve, Chart	Eng. Driven Generators	13
Temperature & Altitude Considerations, Applications	Applications	6
Temperature Classification	P-Type Motors	20
Temperature Limits	P-Type Motors	14
Temperature Limits, External	P-Type Motors	14
Temperature Limits, Internal	P-Type Motors	14

TOPIC	BOOK SUBJECT	PAGE
Temperature Limits & Standards	Insulation	41
Temperature Measurement, Windings	Insulation	40-45
Temperature Rise, AC Generators	Eng. Driven Generators	14
Temperature Rise for Various Parts of an Electric Machine, Diagram	Insulation	44
Temperature Rise Tests	P-Type Motors	14
Temperature Rises, Armature Windings, NEMA Chart	Insulation	41
Temperature Rise Standards for Large Induction Motors, Chart	Insulation	59
Test Preparation	P-Type Motors	12
Testing for P-Type Motors	P-Type Motors	12
Tests, Characteristic Curves	AC Mtrs & Cntrls: Fundamentals	29
TEWAC	P-Type Motors	17
Thermal Overload Relay Types	Motor Controls	29-31
Three Phase Power, Formula	Motor Starting: I & M	11
Throttling Losses Saved by Magnetic Drive & Var. Freq. Drive, Diagram	Synchronous Motors	31
Time Constant	Eng. Driven Generators	12
Time Delay Undervoltage System for Induction Motor Control, Diagram	Motor Controls	31
Torque	Induction Motors	13
Torque	Synchronous Motors	10-19
Torque, Amortisseur Windings	Synchronous Motors	10-12
Torque Components During Starting, Diagram	Synchronous Motors	12
Torque Curve Showing Operation as Both Induction Motor & Induction Generator, Diagram	Induction Motors	14
Torque Curves for NEMA B, C & D Induction Motors, Diagram	AC Mtrs & Cntrls: Fundamentals	41
Torque Definition	AC Mtrs & Cntrls: Fundamentals	22
Torque, Different Types	Synchronous Motors	10
Torque, Formula	Synchronous Motors	10
Torque & KVA Characteristics of NEMA B and EM Design "X" Extra Low KVA Induction Motors, Diagram	AC Mtrs & Cntrls: Fundamentals	42
Torque, Net Accelerating	Synchronous Motors	12
Torque, Pull-In	Synchronous Motors	14
Torque, Pull-Out	Synchronous Motors	18
Torque, Pull-Up	Synchronous Motors	12
Torque, Pulsating	Synchronous Motors	18
Torque, Reluctance	Synchronous Motors	14
Torque, Synchronizing	Synchronous Motors	14
Torque, Synchronous Speeds, Slip, Efficiency, HP Determination	Induction Motors	7-9
Torque, Synchronous	Synchronous Motors	16
Torques, Squirrel Cage	AC Mtrs & Cntrls: Fundamentals	38
Transient Pull-Out Torque of Synchronous Motor, Diagram	AC Mtrs & Cntrls: Fundamentals	28
Tropical Insulation	AC Mtrs & Cntrls: Fundamentals	11
Tropical Insulation	Induction Motors	10
Turn-to-Turn Testing, Insulation	Insulation	53
Two-Speed, Constant-Torque Speeds & Ratings, Chart	Induction Motors	23
Types of Motor Starting	Motor Controls	16

TOPIC	BOOK SUBJECT	PAGE
Typical Model of P-Type Electrical Apparatus, Diagram	P-Type Motors	5
Typical Power Supply System & Load, Diagram	Motor Starting: I & M	6
Typical Speed-Torque Curve for NEMA Design B Squirrel-Cage Motor, Diagram	Induction Motors	19
Typical Starting Torque for Synchronous Motor Connected to High Inertia Machine, Diagram	AC Mtrs & Cntrls: Fundamentals	26
Unity & Lagging Power Factors, Diagram	AC Mtrs & Cntrls: Fundamentals	8
Unity, Lagging & Leading Power Factors, Chart	Power Factor	11
Unity Power Factor Motor in Terminal Voltage Application, Diagram	Synchronous Motors	6
V-Curves	AC Mtrs & Cntrls: Fundamentals	20
V-Curves Showing Relationship of Current to Excitation, Diagram	Power Factor	15
Vacuum Pressure Impregnation	Insulation	17
Vacuum Pumps & Compressors, Motor Applications	Applications	10-19
Vacuum Pumps, Synchronous Motor Applications	Synchronous Motors	25
Vacuum-Quench Contactor	Motor Controls	26-27
Variable-Torque Loads, Ampli-Speed	Adjustable Speed	9
Vector of Power Factor Correction with Capacitor, Diagram	Power Factor	19
Ventilation, Ambient Conditions & Air Requirements	Installation & Maintenance	4
Vertical Ampli-Speed Magnetic Drives, Diagram	Adjustable Speed	7
Vertical Induction Motors	Induction Motors	11
Vibration & Noise	Installation & Maintenance	32
Voltage Dip Protection	Motor Controls	31
Voltage Drop at Starting, Effect of Initial Conditions	Motor Starting: I & M	20
Voltage Drop, DC & Single Phase AC	Motor Starting: I & M	13
Voltage Drop, Graphic Method	Motor Starting: I & M	16
Voltage Drop & Restoration Characteristics When Load Is Applied to Generator, Diagram	Eng. Driven Generators	19
Voltage Drop, Three Phase System	Motor Starting: I & M	15
Voltage Regulator	Eng. Driven Generators	18
Voltage Relationship Between a Generator & Synchronous Motor Operating at No Load, Diagram	AC Mtrs & Cntrls: Fundamentals	21
Voltage Relationship Between Generator & Synchronous Motor Operating At No Load, Diagram	Power Factor	15
Voltage Service Types for Engine Driven AC Generators, Chart	Eng. Driven Generators	21
Voltage Triangle, Diagram	Motor Starting: I & M	13
Voltage Vector Relationships	Power Factor	8
Volts, Amperes & Watts Where Current Lags Voltage by 60°, Diagram	Induction Motors	6
VPI, Insulation Process	Insulation	18-23
Water Cooling	Installation & Maintenance	7
Water Flood Recovery Pumping Drives, Application, Ampli-Speed	Adjustable Speed	34-35
Waterworks Pump Drives, Application, Ampli-Speed	Adjustable Speed	24-27
Watts, Kilowatts, Megawatts, KVA & MVA for DC plus 1, 2, & 3-Phase AC, Formula	AC Mtrs & Cntrls: Fundamentals	9
Wave Form	Eng. Driven Generators	12
When Voltage & Current Are 90° Out Of Phase, Power Is All Reactive, Diagram	Induction Motors	6

master index xx

TOPIC	BOOK SUBJECT	PAGE
Winding Condition	Installation & Maintenance	15
Winding Temperature Measurement	Insulation	40-45
Work-Mechanical, Formula	Power Factor	4
Wound Rotor Induction Motor Control	Motor Controls	46
Wound Rotor Motor, Starting Torque & KVA for Centrifugal Pump or Compressor, Chart	AC Mtrs & Cntrls: Fundamentals	47
Wound Rotor Motor, Starting Torque & KVA for Constant Torque Load, Chart	AC Mtrs & Cntrls: Fundamentals	47
Wound Rotor Motor, Starting Torque & KVA for Loaded Recip. Compressor, Chart	AC Mtrs & Cntrls: Fundamentals	47
Wound Rotor Motor, Starting Torque & KVA for Unloaded Recip. Compressor, Chart	AC Mtrs & Cntrls: Fundamentals	47
Wound Rotor Motor, Torque Curves at Various Steps of External Resistance in Secondary Circuit, Chart	AC Mtrs & Cntrls: Fundamentals	46
Wound Rotor Motors	AC Mtrs & Cntrls: Fundamentals	45
Wound-Rotor Motor Control	Induction Motors	26-28
Wound-Rotor Motors, Applications	Induction Motors	24
Wound-Rotor Motors, Controlling Secondary Resistance, Diagram	Induction Motors	24
Wound-Rotor Motors, Speed Control	Induction Motors	23-24
Wound-Rotor Motors, Starting Currents with Various Steps of Resistance in Secondary Circuit, Diagram	Induction Motors	24
Wound-Rotor Motors, Torque Curves with Various Steps of Resistance in Secondary Circuit, Diagram	Induction Motors	24
Wound-Rotor (Slip Ring) Induction Motors	Induction Motors	23
Zero Sequence Reactance	Eng. Driven Generators	12