

# IEEE Std 3004.8™ 2016

Recommended Practice  
for Motor Protection in  
Industrial and Commercial  
Power Systems



# IEEE Recommended Practice for Motor Protection in Industrial and Commercial Power Systems

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**Abstract:** The protection of motors used in industrial and commercial power systems is covered. It is likely to be of greatest value to the power-oriented engineer with limited experience in the area of protection and control. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

**Keywords:** coordination, IEEE 3004.8, induction motors, inverse-time overcurrent element, motor protection, motor protection relay, negative sequence characteristics, overcurrent protection, permanent magnet motors, relay protection, resistive temperature detector, rotors, rotor thermal protection, stators, stator thermal protection, synchronous motors, temperature detector voting, temperature sensors, thermal model overload protection, unbalanced protection

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- Power Systems Design (3001 series)
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### IEEE Std 3004.8

A general update was made to the material from Chapter 10 of the *IEEE Buff Book*™. Material added or expanded includes details for reduced-voltage motor starting, recommended protection functions using multifunction motor protection relays for contactor controlled fused starters and breaker controlled starters, along with single-line and three-line diagrams, adjustable speed drive applications, dc motor protection, motor bus transfer, partial discharge monitoring, and a detailed example of motor protection using a multifunction motor protection relay.

## Contents

1. Scope.....	16
2. Normative references .....	16
3. Definitions, abbreviations, and acronyms .....	19
3.1 Definitions .....	19
3.2 Acronyms and abbreviations .....	23
4. General discussion .....	25
4.1 Introduction .....	25
4.2 Low-voltage systems.....	26
4.3 Medium-voltage systems.....	26
5. Factors to consider in protection of motors.....	26
5.1 Motor characteristics .....	26
5.2 Motor-starting conditions .....	28
5.3 Ambient conditions .....	35
5.4 Driven equipment .....	35
5.5 Power system quality.....	36
5.6 Motor importance.....	36
5.7 Load side faults for motor controllers.....	36
5.8 Ground faults.....	37
5.9 Maintenance capability and schedule .....	37
5.10 Service factor.....	38
5.11 Application considerations .....	38
5.12 Motor and conductor protection .....	38
5.13 Fixed capacitor applications .....	40
6. Types of protection .....	40
6.1 Purpose of motor protection .....	40
6.2 Abnormal power supply conditions .....	43
6.3 Phase unbalance protection (Device 46, current) (Device 47, voltage) (Device 60).....	46
6.4 Overcurrent protection (Device 51, inverse time) (Device 50, instantaneous) .....	49
6.5 Ground fault relay.....	50
6.6 Underexcitation (loss of field) protection (Device 40).....	50
6.7 Overexcitation (volts/hertz) protection (Device 24).....	50
6.8 Bearing protection relay (Device 38).....	50
6.9 Mechanical condition protection relay (Device 39).....	50
6.10 Thermal and electronic overload protection (Device 49).....	50
6.11 Motor bus automatic transfer or reclosing .....	51
6.12 Multifunction relay (Device 11) .....	56
7. Low-voltage (LV) motor protection .....	58
7.1 Introduction .....	58
7.2 Low-voltage motor overcurrent protection.....	59
7.3 Low-voltage motor ground fault protection.....	63
7.4 Low-voltage motor stator winding overtemperature (Device 49S).....	64
7.5 Low-voltage motor undervoltage protection .....	66
8. MV motor protection.....	66
8.1 Introduction .....	66
8.2 MV motor thermal overload protection (Device 49).....	69
8.3 MV motor overcurrent protection.....	71

8.4	Fault protection.....	76
8.5	Monitors .....	81
8.6	Synchronous motor protection .....	94
8.7	Starting protection .....	98
8.8	Rotor winding protection.....	99
8.9	Lightning and surge protection .....	100
8.10	Protection against overexcitation from shunt capacitance .....	102
8.11	Protection against failure to rotate .....	103
9.	Protection for ac ASD applications.....	104
9.1	ASD general information.....	104
9.2	Low voltage ac ASD motor protection.....	111
9.3	MV ac ASD motor protection .....	112
10.	LV dc motor protection.....	122
10.1	General .....	122
10.2	Potential failure conditions.....	123
10.3	LV dc motor protection methods.....	123
10.4	Safety interlocks .....	125
10.5	Ambient environmental protection .....	125
11.	Motor protection for hazardous (Classified) locations.....	125
11.1	General .....	125
11.2	Motor protection for Class I, Division 2, and Class I, Zone 2 areas .....	125
11.3	Motor protection for Class II areas .....	126
	Annex A (informative) Bibliography.....	127
	Annex B (informative) IEEE device designations.....	132
	Annex C (informative) Motor condition monitors, online.....	139
	Annex D (informative) Motor protection examples .....	144
	Annex E (informative) Motor open circuit time constant .....	160

## List of Figures

Figure 1—Typical motor-starting and capability curves (specific motor terminal voltage and for cold start)	29
Figure 2—Typical solid-state reduced-voltage motor starter with internal shorting device, schematic	31
Figure 3—Typical solid-state reduced-voltage motor starter with external shorting device controlled by “End of Start” relay, schematic	31
Figure 4—Wye-delta reduced-voltage starter, open transition	33
Figure 5—Wye-delta reduced-voltage starter, closed transition	34
Figure 6—Typical time-current and thermal limit characteristic curves	36
Figure 7—MV induction motor 1-line diagram, typical minimum protection functions with fuses	42
Figure 8—MV induction motor 3-line diagram, typical minimum protection functions with fuses	43
Figure 9—Device 47 VT locations and Device 46 CT location for motor protection	48
Figure 10—Loss-of-phase currents for various transformer and motor winding configurations	48
Figure 11—Thermal overload curves, a) cold and b) warm	51
Figure 12—Multifunction motor bus transfer system, Devices 25, 27, 50, 50BF, 60FL, 81	56
Figure 13—Multifunction motor protection relay, Device 11M	57
Figure 14—Five main areas of LV motor coordination studies (Padden and Pillai [B48])	59
Figure 15—Typical LV starter one-line diagrams for industrial applications using MCCs or combination starters	59
Figure 16—Time-current curve for a 100 hp motor with size 4 contactor, Class 10 overload, and an instantaneous trip circuit breaker with a setting of 12 times full load current	62
Figure 17—Typical PTC characteristics	65
Figure 18—Typical NTC characteristics	65
Figure 19—MV induction motor protection 1-line diagram, Device 11M, critical service protection functions, with breaker	68
Figure 20—MV induction motor protection 3-line diagram, Device 11M, critical service protection functions, with breaker	69
Figure 21—Typical motor curves	70
Figure 22—Typical setting of 50/51 overcurrent motor protection	72
Figure 23—Protection of high-inertia motor	73
Figure 24—Alternate method of protecting a high-inertia motor	74
Figure 25—Protection of high-inertia motor using an impedance relay	75
Figure 26—Schematic of locked rotor protection of <a href="#">Figure 25</a>	75
Figure 27—Conventional phase differential protection using three (3) percentage differential relays	76

Figure 28—Motor differential protection .....	77
Figure 29—Split-winding motor overcurrent protection used with two windings per phase (one relay shown).....	78
Figure 30—Ground fault overcurrent protection using a zero sequence CT (Dudor and Padden [B12]).....	80
Figure 31—Vibration-monitoring system .....	86
Figure 32—Typical proximity transducer system: proximitor, cable, and probe.....	88
Figure 33—Typical proximity transducer installations .....	88
Figure 34—Vibration monitoring system panels.....	89
Figure 35—Machine vibration limits (Resiliently Mounted) per NEMA MG-1-2011, Part 7 .....	92
Figure 36—Shaft vibration limits (relative to bearing housing using non-contact vibration probes): for all hydrodynamic sleeve-bearing motors; with the motor securely fastened to a massive foundation.....	93
Figure 37—Bearing housing vibration limits: for sleeve and antifriction bearing motors; with the motor securely fastened to a massive foundation .....	94
Figure 38—MV synchronous motor protection 1-line diagram, Device 11M, critical service protection functions, with breaker.....	95
Figure 39—MV synchronous motor protection 3-line diagram, Device 11M, critical service protection functions, with breaker.....	96
Figure 40—Rotor ground protection of wound-rotor motor.....	100
Figure 41—Excess shunt capacitance from utility line, which is likely to overexcite a large high-speed motor .....	103
Figure 42—Motor speed versus torque for adjustable speed drive power (NEMA 2007 [B42]) .....	106
Figure 43—Typical LV adjustable speed drive.....	106
Figure 44—Typical adjustable speed drive zones of protection .....	107
Figure 45—Two-contactor bypass system .....	108
Figure 46—Three-contactor bypass system .....	108
Figure 47—Typical ASD internal overload protection for self-cooled motors .....	110
Figure 48—MV typical adjustable speed drive protection .....	114
Figure 49—Zone 1 protection with a transformer and ground fault protection; and without a transformer..	115
Figure 50—Zone 2 power electronics protection .....	116
Figure 51—Zone 3 induction and synchronous motor protection with and without differential.....	117
Figure 52—Typical V/Hz excitation curve of an induction motor.....	120
Figure 53—MV multi-motor synchronous transfer system.....	121
Figure 54—LV dc motor protection .....	124
Figure C.1—Three main types of OLPD sensors used for MV motors.....	140

Figure C.2—HFCT sensor installation—one per phase (permanent and temporary installation).....	141
Figure C.3—Measurement range for a wideband HFCT sensor connected at the switchgear enclosure for XLPE cables .....	142
Figure D.1—Critical service induction motor example, 1-line diagram.....	145
Figure D.2—MV example time current characteristic curve plot, phase faults .....	157
Figure D.3—MV example time current characteristic curve plot, ground faults .....	158
Figure D.4—MV example time current characteristic curve plot, locked rotor function.....	159
Figure E.1—Typical motor equivalent circuit .....	160

## List of Tables

Table 1—Nameplate voltage ratings of standard LV induction motors .....	26
Table 2—Nameplate voltage ratings of standard MV induction motors .....	26
Table 3—Typical characteristics and applications of fixed frequency medium ac squirrel-cage induction motors (NEMA MG 10-2013 [B44]) .....	27
Table 4—Comparison of electro-mechanical reduced-voltage starters .....	30
Table 5—Examples of 600 V conductor insulation types and their maximum short-circuit temperature <sup>a</sup> .....	39
Table 6—Typical motor protection functions <sup>1</sup> .....	41
Table 7—Unfiltered housing vibration limits per NEMA MG-1-2011, Part 7 .....	91
Table 8—The equivalent motor insulation surge withstand voltage by present standard test for commercially used motor voltages .....	101
Table B.1—Relationship between IEEE Std C37.2 device function numbers, NEMA designations, and IEC 61850-7-4 logical nodes .....	132
Table B.2—Additional protection functions for synchronous motors and field excitation systems <sup>a</sup> .....	134
Table B.3—Security, communication, and other protection functions <sup>a</sup> .....	135
Table C.1—OLPD guideline levels for MV motors in the 10 kV to 15 kV voltage class .....	143
Table D.1—Typical MV motor protection device settings <sup>a</sup> .....	144
Table D.2—MV motor data sheet <sup>a</sup> .....	145
Table D.3—Relay Device 11M, CT and VT properties .....	147
Table D.4—Device 11M protection settings .....	148
Table D.5—Device 11M input devices and settings .....	155
Table D.6—Device 11M output signals and settings .....	156

# IEEE Recommended Practice for Motor Protection in Industrial and Commercial Power Systems

## 1. Scope

This recommended practice covers the protection of motors used in industrial and commercial power systems. It is likely to be of greatest value to the power-oriented engineer with limited experience in the area of protection and control. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

## 2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

API Std 541, Form-Wound Squirrel Cage Induction Motors—500 Horsepower and Larger, 5th Edition.<sup>1</sup>

API Std 546, Brushless Synchronous Machines—500 kVA and Larger, 3rd Edition.

API Std 547, General-Purpose Form-Wound Squirrel Cage Induction Motors—250 Horsepower and Larger, 1st Edition.

IEEE Std 43<sup>TM</sup>, IEEE Recommended Practice for Testing Insulation Resistance of Electric Machinery.<sup>2,3</sup>

IEEE Std 112<sup>TM</sup>, IEEE Standard Test Procedure for Polyphase Induction Motors and Generators.

IEEE Std 115<sup>TM</sup>, IEEE Guide for Test Procedures for Synchronous Machines Part I—Acceptance and Performance Testing Part II—Test Procedures and Parameter Determination for Dynamic Analysis.

IEEE Std 141<sup>TM</sup>-1993 (Reaff 1999), IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (*IEEE Red Book*<sup>TM</sup>).

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