Motor Overload Setting Table

IEC 60947-4-1 & NEC 430 Compliant Overload Relay Sizing Workbook

How to Use This Workbook

1. Go to the "Overload Setting Table" sheet.

2. Enter one row per motor: Motor Tag, Rated Power, Voltage, Phase, Nameplate Full-Load Amps (FLA), Service Factor, and Ambient/Temperature-Rise class.

3. Select the governing Standard for each motor from the dropdown: NEC (NEC 430) or IEC (IEC 60947-4-1).

4. The sheet automatically calculates the overload relay Basic Setting, the maximum permitted setting where a higher setting is needed to allow the motor to start, and (for IEC) the recommended trip class guidance.
5. If you do not have a nameplate FLA value, look it up on the "NEC FLA Table" sheet (Table 430.250 / 430.248) using motor HP and voltage.

6. Blue cells are inputs. Black cells are calculated automatically — do not overwrite them.

7. Use File > Print, or File > Export as PDF, to generate a hard-copy overload setting record for your project file.

Sheet Contents

Overload Setting Table	Main calculator — enter motor data, get overload relay settings
NEC FLA Table	NEC Table 430.250 (3-phase) and 430.248 (1-phase) full-load current reference
IEC Trip Class Reference	IEC 60947-4-1 overload relay trip class selection guidance

Motor Overload Setting Table

Enter motor nameplate data below — overload relay settings are calculated automatically per NEC 430 / IEC 60947-4-1

Input **Calculated**

Motor Tag / ID	Rated Power	Unit	Voltage (V)	Phase	Nameplate FLA (A)	Service Factor	Temp Rise ≤ 40°C?	Standard	Basic OL Setting (%)	Basic OL Setting (A)	Max OL Setting (%)*	Max OL Setting (A)*	IEC Trip Class	Compliance Note
Motor-101	40	HP	380	3	53	1.15	Yes	NEC	125%	66.25 A	140%	74.20 A		Per NEC 430.32: set relay at Basic OL Setting. If motor will not start/carry load, increase up to Max OL Setting per 430.32(C).
Motor-102	15	kW	400	3	29	1	No	IEC	100%	29.00 A			10	Per IEC 60947-4-1: set relay current at motor nameplate FLA; confirm trip class (column O) matches motor starting time.

* Max OL Setting applies only where the Basic OL Setting will not allow the motor to start or carry its load (NEC 430.32(C)); it requires supplementary protection sensitive to motor overheating (e.g. thermal protector) and is not the default setting. For IEC applications, verify the adjustable current range of the specific overload relay against the required setting, and select the trip class (10A/10/20/30) to suit the motor starting time and load type — see the "IEC Trip Class Reference" sheet.

NEC Full-Load Current Reference Tables

Use only when nameplate FLA is not available — nameplate current always takes precedence per NEC 430.6(A)

Table 430.250 — Three-Phase AC Induction Motors, Full-Load Current (A)

HP	200 V	208 V	230 V	460 V	575 V
0.5	2.5	2.4	2.2	1.1	0.9
0.75	3.7	3.5	3.2	1.6	1.3
1	4.8	4.6	4.2	2.1	1.7
1.5	6.9	6.6	6	3	2.4
2	7.8	7.5	6.8	3.4	2.7
3	11	10.6	9.6	4.8	3.9
5	17.5	16.7	15.2	7.6	6.1
7.5	25.3	24.2	22	11	9
10	32.2	30.8	28	14	11
15	48.3	46.2	42	21	17
20	62.1	59.4	54	27	22
25	78.2	74.8	68	34	27
30	92	88	80	40	32
40	120	114	104	52	41
50	150	143	130	65	52
60	177	169	154	77	62
75	221	211	192	96	77
100	285	273	248	124	99
125	359	343	312	156	125
150	414	396	360	180	144
200	552	528	480	240	192

Table 430.248 — Single-Phase AC Motors, Full-Load Current (A)

HP	115 V	200 V	208 V	230 V
0.5	9.8	5.6	5.4	4.9
0.75	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1.5	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7.5	80	46	44	40
10	100	57.5	55	50

Source: NEC Table 430.250 (three-phase) and Table 430.248 (single-phase), values as commonly published for NEMA-rated general-purpose motors. These are used for sizing conductors, overcurrent devices, and controllers when actual nameplate current is not available — they are NOT a substitute for the motor nameplate FLA. Always verify against the current edition of NFPA 70 (NEC) in effect for your jurisdiction, as values are subject to periodic code revision.

IEC 60947-4-1 Overload Relay Trip Class Guidance

For sizing and selecting thermal / electronic overload relay trip class on the Overload Setting Table sheet

Trip Class	Max Trip Time at 7.2x Ie (s)	Typical Application	Example Loads
Class 10A	≤ 2	Fast starting, light/normal starting duty	Pumps, fans, general machine tools with quick start
Class 10	≤ 4	Standard duty — most general-purpose motors (most common)	Conveyors, compressors, general industrial motors
Class 20	≤ 8	Longer starting time / higher inertia loads	Centrifuges, large fans, crushers
Class 30	≤ 12	Heavy starting duty, high-inertia or reduced-voltage starts	Large centrifugal loads, ball mills, extruders

Setting Guidance

- Set the overload relay current (Ir / FLA setting) equal to the motor nameplate full-load current (FLA), not the relay's own maximum rating.
- Select the trip class based on the motor's actual starting time (from the motor datasheet or acceleration study) with margin — choose a class whose maximum trip time safely exceeds the starting time.
- For Direct-On-Line (DOL) starting of standard NEMA/IEC motors, Class 10 or 10A is typical.
- For reduced-voltage starting (star-delta, soft starter, VFD bypass) or high-inertia loads, Class 20 or 30 is often required to avoid nuisance tripping during start.
- Confirm the relay's adjustable current range covers the required FLA setting, and verify ambient temperature compensation matches installation conditions.
- Always cross-check the final setting against the specific overload relay manufacturer's data sheet.

Reference: IEC 60947-4-1 (Low-voltage switchgear and controlgear — Contactors and motor-starters — Electromechanical contactors and motor-starters), overload relay trip class definitions. Trip classes and test currents are as defined in the standard; consult the current edition and the relay manufacturer's certified data for final selection.