



Technical resources

Conversions

Metric to AWG	
Metric size mm ²	AWG/kcmil
0.14	26
0.25	24
0.35	22
0.38	22
0.5	21
0.75	19
1.00	18
1.5	16
2.5	14
4	12
6	10
10	8
16	6
25	4
35	2
50	1
70	2/0
95	3/0
120	4/0
150	250 kcmil
185	350 kcmil
240	450 kcmil
300	550 kcmil

Unit conversion	
Metric	US (imperial)
1 mm	0.03937"
1 cm	0.3937"
1 m	3.28 ft
1 km	3280 ft
1 g	0.0353 ounces
1 kg	2.2 lbs

Weight conversion	
kg/km	Lbs./Mft
100	≈ 67.197
X kg/km x 67.197 = lbs./Mft	
X kg/km x 0.067197 = lbs./ft	

Temperature	
°C	°F
-40	-40
-30	-22
-25	-13
-20	-4
-15	5
-10	14
-5	23
0	32
30	86
70	158
80	176
85	185
90	194
105	221

Cable designations and abbreviations explained

designation	meaning
4G2.5	4C 2.5mm ² , one conductor marked as gn/ye ground
4x2.5	4C 2.5mm ² , no ground included
(4G2.5)	4C 2.5 mm ² with ground, overall shield indicated by brackets
(2x2x0.5)	2 twisted pairs 0.5mm ² , overall shield
[2x(2x0.5)]	2 twisted shielded pairs 0.5mm ² , overall shield
H	Tape shield
H1	Spiral shield
H2	Braid shield



Ampacity per NFPA 79 2021 edition Table 12.5.1 (abbreviated)

Conductor size AWG / kcmil	Ampacity		
	60° C (140 °F)	75 °C (167 °F)	90 °C (194 °F)
30	-	0.5	0.5
28	-	0.8	0.8
26	-	1	1
24	2	2	2
22	3	3	3
20	5	5	5
18	7	7	14
16	10	10	18
14	15	20	25
12	20	25	30
10	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	110
2	95	115	130
1	110	130	145
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380
500	320	380	430

- Notes: (1) Conductor types listed in section 12.3.1 NFPA 79 shall be permitted to be used at the ampacities listed in this table
 (2) The sources for ampacities in this table is table 310.15(B)(16) / 310.16 of NFPA 70 (NEC)
 (3) TecniKabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.

Correction factors

Based on table 12.5.5(a) Ambient Temperature Correction Factors. For ambient temperatures other than 30 °C (86 °F), multiply the allowable ampacity by the appropriate factor shown in the table:

Ambient Temperature	Correction Factor 60 °C	Correction Factor 75 °C	Correction Factor 90 °C
21-25	1.08	1.05	1.04
26-30	1.00	1.00	1
31-35	0.91	0.94	0.96
36-40	0.82	0.88	0.91
41-45	0.71	0.82	0.87
46-50	0.58	0.75	0.82
51-55	0.41	0.67	0.76
56-60	-	0.58	0.71
61-70	-	0.33	0.58
71-80	-	-	0.41



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Based on table 12.5.5(b) Adjustment Factors for More Than Three Current Carrying Conductors in Raceway or Cable:

Number of Current-Carrying Conductors	Percent of Values in Table 12.5.1 and 12.5.5(a), as Adjusted for Ambient Temperature as necessary
4-6	80
7-9	70
10-20	50
21-30	45
31-40	40
≥ 41	35

Notes: (1) TecniKabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.

Ampacity per NEC Table 310.16 (abbreviated, copper conductors only)

Conductor size AWG / kcmil	Ampacity		
	60° C (140 °F) Types TW, UF	75 °C (167 °F) Types RHW, THHW, THW THWN, XHHW, XHWN, USE, ZW	90 °C (194 °F) Types TBS, SA, SIS, FEP, FEPB MI, PFA, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN, Z, ZW-2
18	-	-	14
16	-	-	18
14	15	20	25
12	20	25	30
10	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	115
2	95	115	130
1	110	130	145
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380
500	320	380	430

Notes: (1) NEC Section 310.15(B) shall be used for ambient temperature correction other than 30 °C.
 (2) NEC Section 310.15(C) shall be referenced for more than three current carrying conductors
 (3) NEC Section 310.16 shall be referenced for conditions of use
 (4) TecniKabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.



Simplified 75 °C Cable Sizing Guide for AC Induction Motors per NEC 430.250

Table for 75 °C cables with four conductors (3 phases plus ground)

AWG size	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	25	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
10	6	35	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
8	10	50	≤ 10 HP (7.5 KW)	≤ 30 HP (22.4 KW)	≤ 30 HP (22.4 KW)
6	16	65	≤ 15 HP (11.2 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
4	25	85	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
2	35	115	≤ 25 HP (18.6 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)
1	50	130	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1/0	-	150	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
2/0	70	175	≤ 50 HP (37 KW)	≤ 100 HP (75 KW)	≤ 125 HP (93 KW)
3/0	95	200	≤ 60 HP (45 KW)	≤ 125 HP (93 KW)	≤ 150 HP (112 KW)
4/0	120	230	≤ 60 HP (45 KW)	≤ 150 HP (112 KW)	≤ 150 HP (112 KW)

Table for 75 °C cables with four conductors (3 phases plus ground) and one control pair (80% derated)

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	16	≤ 3HP (2.24 KW)	≤ 7.5 HP (5.6 KW)	≤ 10 HP (7.5 KW)
12	4	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	28	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	40	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 30 HP (22.4 KW)
6	16	48	≤ 10 HP (7.5 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
4	25	68	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
2	35	92	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
1	50	104	≤ 25 HP (18.6 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)

Table for 75 °C cables with four conductors (3 phases plus ground) and two control pairs (70% derated)

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	14	≤ 3HP (2.24 KW)	≤ 7.5 HP (5.6 KW)	≤ 10 HP (7.5 KW)
12	4	17.5	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	24.5	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
8	10	35	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
6	16	45.5	≤ 10 HP (7.5 KW)	≤ 25 HP (18.6 KW)	≤ 30 HP (22.4 KW)

Notes: Type of motor design is B.

Class of Service and Duty-Cycle Service is continuous

Copper conductors rated 75 °C, at ambient temperature between 26 and 30 °C

Values are based on NEC 2020 430.250, power factor 1.25, ampacities are based on NEC 310.16, 75 °C

Derating for control pairs based on NEC 310.15C

Disclaimer: This is a simplified sizing guide, the final selection and sizing is the responsibility of the Authority Having Jurisdiction (AHJ) for the application. Please also refer to the drive manuals.



Simplified 90 °C Cable Sizing Guide for AC Induction Motors per NEC 430.250

Table for 90 °C cables with four conductors (3 phases plus ground)

AWG size	Metric size mm ²	Amp rating 90 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	14	See drive manual or NEC 430.22(G)		
16	1.5	18	See drive manual or NEC 430.22(G)		
14	2.5	25	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
12	4	30	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
10	6	40	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 30 HP (22.4 KW)
8	10	55	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
6	16	75	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
4	25	95	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
2	35	130	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1	50	145	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1/0	-	170	≤ 50 HP (37 KW)	≤ 100 HP (75 KW)	≤ 125 HP (93 KW)
2/0	70	195	≤ 60 HP (45 KW)	≤ 125 HP (93 KW)	≤ 150 HP (112 KW)
3/0	95	225	≤ 60 HP (45 KW)	≤ 150 HP (112 KW)	≤ 150 HP (112 KW)
4/0	120	260	≤ 75 HP (56 KW)	≤ 150 HP (112 KW)	≤ 200 HP (149 KW)

Table for 90 °C cables with four conductors (3 phases plus ground) and one control pair (80% derated)

AWG size (power)	Metric size mm ²	Amp rating 90 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	11	See drive manual or NEC 430.22(G)		
16	1.5	14	See drive manual or NEC 430.22(G)		
14	2.5	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	24	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
10	6	32	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	44	≤ 10 HP (7.5 KW)	≤ 25 HP (18.6 KW)	≤ 30 HP (22.4 KW)
6	16	60	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
4	25	76	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
2	35	104	≤ 30 HP (22.4 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)
1	50	116	≤ 30 HP (22.4 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)

Table for 90 °C cables with four conductors (3 phases plus ground) and two control pairs (70% derated)

AWG size (power)	Metric size mm ²	Amp rating 90 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	9.8	See drive manual or NEC 430.22(G)		
16	1.5	12.6	See drive manual or NEC 430.22(G)		
14	2.5	17.5	≤ 3HP (2.24 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	21	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	28	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	38.5	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
6	16	52.5	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)

Notes: Type of motor design is B.

Class of Service and Duty-Cycle Service is continuous

Copper conductors rated 75 °C, at ambient temperature between 26 and 30 °C

Values are based on NEC 2020 430.250, power factor 1.25, ampacities are based on NEC 310.16, 75 °C

Derating for control pairs based on NEC 310.15C

Disclaimer: This is a simplified sizing guide, the final selection and sizing is the responsibility of the Authority Having Jurisdiction (AHJ) for the application. Please also refer to the drive manuals.



YOUR SOURCE FOR MOTION CONTROL CABLES AND CONNECTORS

Cable jacket colors per DESINA

Cable jacket materials are available in many colors. The machine tool industry has adopted a standard referred to as DESINA, that aims to standardize cable colors and their interconnection into one common platform for machine tools and manufacturing systems. DESINA is short for (DEcentralized and Standardized INstallation Technology). The purpose of this standard is, that maintenance personnel can easily identify cable runs and their purpose, even across different machine suppliers. This standard was initially developed for the automotive manufacturing industry and is widely used in motion control applications and machine tools.



As per this standard the following jacket colors are used for the respective applications.

- Orange, RAL 2003: servo power, frequency-controlled devices, shielded
- Green, RAL 6018: measurement cable such as measuring systems, feedback systems, analog sensors, shielded
- Purple, RAL 4001: fieldbus and hybrid field bus, shielded
- Yellow, RAL 1021: actuator/sensor cable, not shielded (ASi)
- Black, RAL 9005: power output, not shielded
- Gray, RAL 7040: multiwire control cable for control voltages and 24 V technology, not shielded

The RAL color code uses a number coded system to define the shade. There can sometimes be a slight shade difference between manufacturers and even between production lots from the same manufacturer.

Sometimes slight deviations from the standard can be found. For example, control cables for voltages greater than 24V are often gray or black, servo feedback cables may be orange, many shielded motor-supply cables as well as power tray cables are commonly made with black jackets.