

SOLUTIONS

Electrical (Distribution) Ltd

Solutions Electrical (Distribution) Limited
 Avondale Business Centre
 Woodland Way
 Kingswood
 Bristol
 BS15 1AW
 Tel: 0117 961 0948
 Fax: 0117 961 0960
 sales@solutionselectrical.co.uk

Tel: 0117 961 0948 Fax: 0117 961 0960

CALCULATION TABLES FOR DC AND AC MACHINES

To Find	Direct Current	ALTERNATING CURRENT		
		Single-Phase	Two-Phase* Four Wire	Three-Phase
Amperes when Horse-power is known	$\frac{H.P \times 746}{E \times \% EFF}$	$\frac{H.P \times 746}{E \times \% EFF \times P.F}$	$\frac{H.P \times 746}{2 \times E \times \% EFF \times P.F}$	$\frac{H.P \times 746}{1.73 \times E \times \% EFF \times P.F}$
Amperes when Kilowatts is known	$\frac{K.W \times 1000}{E}$	$\frac{K.W \times 1000}{E \times P.F}$	$\frac{K.W \times 1000}{2 \times E \times P.F}$	$\frac{K.W \times 1000}{1.73 \times E \times P.F}$
Amperes when K.V.A is Known		$\frac{K.V.A \times 1000}{E}$	$\frac{K.V.A \times 1000}{2 \times E}$	$\frac{K.V.A \times 1000}{1.73 \times E}$
Kilowatts	$\frac{I \times E}{1000}$	$\frac{I \times E \times P.F}{1000}$	$\frac{I \times E \times 2 \times P.F}{1000}$	$\frac{I \times E \times 1.73 \times P.F}{1000}$
K.V.A		$\frac{I \times E}{1000}$	$\frac{I \times E \times 2}{1000}$	$\frac{I \times E \times 1.73}{1000}$
Horse-power (output)	$\frac{I \times E \times \% EFF}{746}$	$\frac{I \times E \times \% EFF \times P.F}{746}$	$\frac{I \times E \times 2 \times \% EFF \times P.F}{746}$	$\frac{I \times E \times 1.73 \times \% EFF \times P.F}{746}$

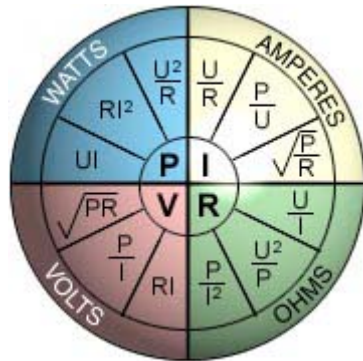
I = Amperes · E = Volts · % EFF = per cent efficiency · P.F = Power Factor .8 · K.W = Kilowatts
 K.V.A = Kilo-Volt-Amperes · H.P = Horse Power
 * For three wire, two phase circuits the current in the common conductor is 1.41 times that in either of the other two conductors.

SOLUTIONS

Electrical (Distribution) Ltd

Tel: 0117 961 0948 Fax: 0117 961 0960

OHMS LAW



SYMBOLS:

V = VOLTAGE IN VOLTS

I = CURRENT IN AMPERES

R = RESISTANCE IN OHMS

P = POWER IN WATTS

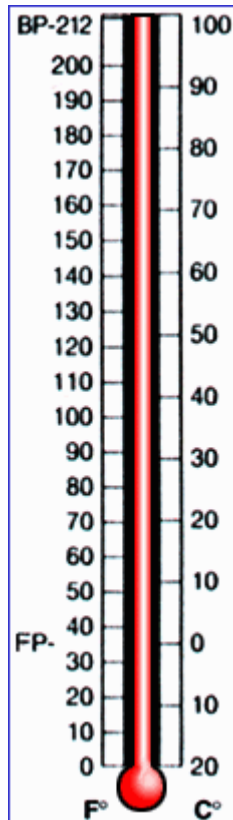
MOTOR CONVERSION CHART

Motor kW	.55	.75	1.1	1.5	Motor kW	18.5	22	30	37	
Ratings HP	.75	1	1.5	2	Ratings HP	25	30	40	50	
To BS775 FLA	1.45	1.85	2.35	3.3	To BS775 FLA	35	40	55	66	
Fuses BS88 D.O.L.	6	6	10	15	Fuses BS88 D.O.L.	80	80	125	125	
Assisted	2	4	4	6	Assisted	40	50	60	80	
Motor kW	2.2	3	4	5.5	Motor kW	45	55	75	90	110
Ratings HP	3	4	5.5	7.5	Ratings HP	60	75	100	125	150
To BS775 FLA	4.9	6.4	7.5	11	To BS775 FLA	80	96	126	156	188
Fuses BS88 D.O.L.	15	20	20	30	Fuses BS88 D.O.L.	150	200	200	250	350
Assisted	10	15	15	20	Assisted	100	100	150	200	250
Motor kW	7.5	10	11	15	Motor kW	132	160	200	220	250
Ratings HP	10	13.5	15	20	Ratings HP	175	220	270	300	350
To BS775 FLA	14	18	21.5	28	To BS775 FLA	216	275	340	375	437
Fuses BS88 D.O.L.	35	40	50	60	Fuses BS88 D.O.L.	350	400	450	500	500
Assisted	20	25	25	35	Assisted	250	350	400	450	500

SOLUTIONS

Electrical (Distribution) Ltd

Tel: 0117 961 0948 Fax: 0117 961 0960



TO CONVERT ↓

MULTIPLY BY:

Inches to millimetres (mm)	25.4
Millimetres to inches	0.03937
Feet to metres (m)	0.3048
Metres to feet (ft)	3.280
Yards to metres	0.9144
Metres to yards (yd)	1.0936
Miles to kilometres (km)	1.6093
Kilometres to miles	0.6214
Square inches to square millimetres (mm ²)	645.16
Square millimetres to square inches (inch ²)	0.00155
Square yards to square metres (m ²)	16.387
Square metres to square yards (yd ²)	1.196
Cubic inches to cubic centimetres (cm ³)	16.387
Cubic centimetres to cubic inches (inch ³)	0.06102
Pounds to kilograms (kg)	0.4536
Kilograms to pounds (lb)	2.2046
Tons (2,240 lb) to kilograms (kg)	1,016.05
Kilograms to tons (2,240 lb)	0.0009842
Ounces (avoirdupois) to grams	28.3495
Grams to ounces (avoirdupois)	0.0353
Gallons to litres (l)	4.561
Litres to gallons	0.220
Force N (Newtons) to lbft	0.225
1N = 1 kg (mass) accelerated at 1 metre/sec.	
1 NM = 1 J (Joule) to calorie	0.239
Horse power to kilowatts (kW)	0.7458
Kilowatts to horse power (h.p)	1.3408
1W (watt) = 1 J/S	
Atmospheres to lb per square inch (lb/inch ²)	14.68
1 bar = 1 kg/cm ² = 735.6mm Hg = 14.2lb/inch ²	


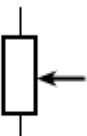

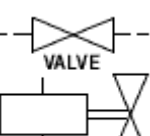
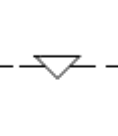
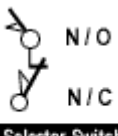

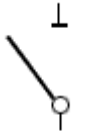
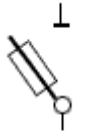



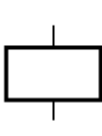
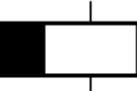
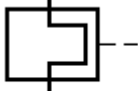
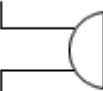
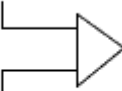
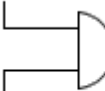
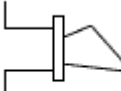
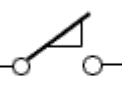


SOLUTIONS

Electrical (Distribution) Ltd

Tel: 0117 961 0948 Fax: 0117 961 0960

USEFUL ELECTRICAL SYMBOLS

 <p>ELECTRICAL SYMBOLS</p>			 <p>VALVE</p>		 <p>N/O N/C</p>	
	POTENTIOMETER	Voltage Transformer eg. solenoid valve	Mechanical Interlock	Selector Switch N/C normally closed N/O normally open	Switch (general)	
						
Isolator	Switchfuse	Circuit Breaker	Contactor (N/O pole)	Contactor (N/C pole)	Coil	- delayed on energization
						
- delayed on de-energization	- thermal overcurrent type	Buzzer	Siren	Bell	Horn	Limit Switch

SOLUTIONS

Electrical (Distribution) Ltd

Tel: 0117 961 0948 Fax: 0117 961 0960

RATED FUSE CURRENTS OF 3 PHASE MOTORS

Motor Rating			230V			400V			415V			500V			690V		
kw	Cosφ	η %	Rated Motor Current A	Fuse starting D.O.L A	Y/Δ A	Rated Motor Current A	Fuse starting D.O.L A	Y/Δ A	Rated Motor Current A	Fuse starting D.O.L A BS	Y/Δ BS	Rated Motor Current A	Fuse starting D.O.L A	Y/Δ A	Rated Motor Current A	Fuse starting D.O.L A	Y/Δ A
0.06	0.7	58	0.37	2	-	0.21	2	-	0.21	2	2	0.17	2	-	0.12	2	-
0.09	0.7	60	0.54	2	-	0.31	2	-	0.30	2	2	0.25	2	-	0.18	2	-
0.12	0.7	60	0.72	4	2	0.41	2	-	0.40	2	2	0.33	2	-	0.24	2	-
0.18	0.7	62	0.75	4	2	0.6	2	-	0.58	2	2	0.48	2	-	0.35	2	-
0.25	0.7	62	1.4	4	2	0.8	4	2	0.8	4	2	0.7	2	-	0.5	2	-
0.37	0.72	66	2	6	4	1.1	4	2	1.1	4	2	0.9	2	2	0.7	2	-
0.55	0.75	69	2.7	10	4	1.5	4	2	1.5	6	4	1.2	4	2	0.9	4	2
0.75	0.79	74	3.2	10	4	1.9	6	4	1.8	6	4	1.5	4	2	1.1	4	2
1.1	0.81	74	4.6	10	6	2.6	6	4	2.6	10	6	2.1	6	4	1.5	4	2
1.5	0.81	74	6.3	16	10	3.6	6	4	3.5	16	10	2.9	6	4	2.1	6	4
2.2	0.81	78	8.7	20	10	5	10	6	4.8	16	10	4	10	4	2.9	10	4
3	0.82	80	11.5	25	16	6.6	16	10	6.4	20	16	5.3	16	6	3.8	10	4
4	0.82	83	14.8	32	16	8.5	20	10	8.2	20	16	6.8	16	10	4.9	16	6
5.5	0.82	86	19.6	32	25	11.3	25	16	10.9	25	20	9	20	16	6.5	16	10
7.5	0.82	87	26.4	50	32	15.2	32	16	14.6	35	25	12.1	25	16	8.8	20	10
11	0.84	87	38	80	40	21.7	40	25	20.9	50	32	17.4	32	20	12.6	25	16
15	0.84	88	51	100	63	29.3	63	32	28.2	80	40	23.4	50	25	17	32	20
18.5	0.84	88	63	125	80	36	63	40	35	80	50	28.9	50	32	20.9	32	25
22	0.84	92	71	125	80	41	80	50	40	80	50	33	63	32	23.8	50	25
30	0.85	92	96	200	100	55	100	63	53	100	80	44	80	50	32	63	32
37	0.86	92	117	200	125	68	125	80	65	125	80	54	100	63	39	80	50
45	0.86	93	141	250	160	81	160	100	78	125	80	65	125	80	47	80	63
55	0.86	93	173	250	200	99	200	125	96	160	100	79	160	80	58	100	63
75	0.86	94	233	315	250	134	200	160	129	250	160	107	200	125	78	160	100
90	0.86	94	279	400	315	161	250	200	155	250	160	129	200	160	93	160	100
110	0.86	94	342	500	400	196	315	200	189	315	200	157	250	160	114	200	125
132	0.87	95	401	630	500	231	400	250	222	355	250	184	250	200	134	250	160
160	0.87	95	486	630	630	279	400	315	269	355	315	224	315	250	162	250	200
200	0.87	95	607	800	630	349	500	400	337	450	355	279	400	315	202	315	250
250	0.87	95	-	-	-	437	630	500	421	500	450	349	500	400	253	400	315
315	0.87	96	-	-	-	544	800	630	525	630	560	436	630	500	316	500	400
400	0.88	96	-	-	-	683	1000	800	-	-	-	547	800	630	396	630	400
450	0.88	96	-	-	-	769	1000	800	-	-	-	615	800	630	446	630	630
500	0.88	97	-	-	-	-	-	-	-	-	-	-	-	-	491	630	630
560	0.88	97	-	-	-	-	-	-	-	-	-	-	-	-	550	800	630
630	0.88	97	-	-	-	-	-	-	-	-	-	-	-	-	618	800	630

(Approximate figures for squirrel-cage motors).

Minimum fuse size for short-circuit protection of 3-phase motors.

The maximum size is determined by the requirements of the switchgear or overload relay
The rated motor currents are for standard 1500 r.p.m. 3-phase enclosed ventilated and totally enclosed fan-cooled motors.

D.O.L. starting : maximum starting current 6 x rated motor current. Maximum starting time : 5 s.

Y/Δ starting : maximum starting current 2 x rated motor current. Maximum starting time : 15 s.
set overload relay in the phase lead to 0.58 x rated motor current.

Rated fuse currents for Y/Δ starting are also valid for 3-phase motors with slip-ring rotors.

For higher rated currents, starting currents / longer starting times, larger fuses will be required.

Table is valid for 'slow' / 'gL' fuses (DIN VDE 0636)

For NH fuses with aM characteristic, fuses = rated current selected.

SOLUTIONS

Electrical (Distribution) Ltd

Tel: 0117 961 0948 Fax: 0117 961 0960

CROSS REFERENCE CHART

AC -3 kW	hp	KLOCKNER MOELLER	ABB	ALLEN BRADLEY	CUTLER HAMMER	CLIPSAL	AGUT	SIEMENS	SPRECHER+ SCHUH	STROMBERG	TELE- MECANIQUE
4	5	DIL EM	B6			6M9/10	MCIA-3	3FT2	CA4-9		LC1-K0910
4	5	DIL 00 M	B9	100-A09N	HR09100-N	6C9/10	CL00	3TF-30	CA3-9	OK00W10	LC1-D910
5.5	7.5	DIL 00 AM	B12	100-A12N	HR1310-N	6C12/10	CL01A3	3TF-31	CA3-12	OK0W10	LC1-DI210
7.5	10	DIL0M	B16	100-A18N	HR1710	6C16/10	CL02A3	3TF-32	CA3-16	OK01W10	LC1-D1810
11	15	DIL0AM	B25	100-A24N	HR2510-N	6C25	CL25A3	3TF-33	CA3-23	OK1W10	LC1-D2510
15	20	DIL 1M	B30	100-A30-N	HR3300-N	6C35	CL04A3	3TF-34	CA3-30	OK1.5W10	LC1-D3210
18.5	25	DIL 1AM		100-A38N	HR 4000-N	6C38	CL05A3	3TF-35	CA3-37N-11	OK02W10	
22	30	DIL 2M	B50	100-A45N	HR 4600-N		CL06A3	3TF-46	CA3-43N-11	OKYM45	LC1-D4011
30	40	DIL 2AM		100-A60N	HR5500-N	6C50	CL07A3	3TF-47	CA3-60N-11	OKYM63	LC1-D5011
37	50	DIL 3M	B63	100-A75N	CE15KN	6C65	CL08A3	3TF-48	CA3-72N-11		LC1-D6511
45	60	DIL3AM	EH80			6C80	CL09A3	3TF-49	CA6-85-11	OKYM75	LC1-D8011
55	80	DIL4M	EH100	100-B110N	CE15MIN	6C95	CL10A3	3TF-50	CA6-105-11	OKYM90	LC1F115
75	100	DIL 4AM	EH145		CE15NN	6C115		3TF-51	CA6-140-E-11	OKYM150	LC1-F150
90	120	DIL6M	EH150	100-B180N	CE15PN	6C150	CK08BA	3TF-52	CA6-170-E-11	OKYM175	LC1-F185
110	145	DIL 6AM	EH160			6C180		3TF-53	CA6-210		LC1-F225
132	175	DIL8M		100-B250N		6C250	CK09BA	3TF-54	CA6-210	OKYM200	LC1-F265
160	215	DIL8AM	EH250	100-B300N	CE15SN			3TF-55	CA6-300	OKYM315	LC1-F330
200	265	DIL10M	EH370	100-B400N		6C400	CK10BA	3TF-56	CA6-420	OKYM400	LC1-F400
250	355	DIL 10 AM			C10GYAN3		CK11BA	3TF-57	CA6-420	OKYM500	LC1-F500
335	450	DIL12AM	EH550	100-B600N	C10GYBN3	6C500	CK12BA	3TF-68	CA5-550	OKYM630	LC1F630
450	600	DIL 14AM	EH800		C10KN3		CK13BA	3TF-69	CA5-850	OKYM800	LC1-F780

NOTE: This serves as a guide only. Technical specifications should be checked against the relevant manufacturers brochures.

