

# FLUID POWER Design Data Sheet



Revised Sheet 78 - Womack Design Data File

## WIRE SIZE AND FUSE RATINGS FOR 3-PHASE INDUCTION MOTORS

Motors are usually protected by both fuses (or circuit breakers) and by heater coils in a magnetic starter. Fuses open the circuit quickly in case of a massive overload or short circuit. Heater coils provide a delay and open the circuit if the average current, over a period of time, is greater than the circuit is designed for.

In some cases it may be necessary to use delayed action fuses. These provide a very short delay to prevent blowing a fuse during the short interval while the motor is accelerating up to its normal speed after being started.

Current values in this chart are approximate, and are

compiled from data published by several motor manufacturers. They may be a little high or low for a specific motor. For selection of magnetic starter heater coils, it is better to follow the nameplate current rating of the actual motor to be used rather than depending on this or any other table.

Wire and fuse sizes are listed for reference only, and may vary with type of insulation, number of conductors in a cable and other factors. For a new design, requirements of the NEC (National Electrical Code) should be followed. Copies of the code can be ordered through most book stores. Other local ordinances may also apply.

HP	Speed RPM	230-Volt Service			460-Volt Service		
		Full Load Amps	Wire Size	Fuse Amps	Full Load Amps	Wire Size	Fuse Amps
1	1,200	3.76	14	10	1.88	14	6
1	1,800	3.56	14	10	1.78	14	6
1	3,600	2.80	14	10	1.40	14	6
1-1/2	1,200	5.28	14	15	2.64	14	10
1-1/2	1,800	4.86	14	15	2.43	14	10
1-1/2	3,600	4.36	14	15	2.18	14	10
2	1,200	6.84	15	20	3.42	14	10
2	1,800	6.40	14	20	3.20	14	10
2	3,600	5.60	14	20	3.00	14	10
3	1,200	10.2	14	25	5.12	14	15
3	1,800	9.40	14	25	4.70	14	15
3	3,600	8.34	14	25	4.17	14	15
5	1,200	15.8	12	30	7.91	14	20
5	1,800	14.4	12	30	7.21	14	20
5	3,600	13.5	12	30	6.76	14	20
7-1/2	1,200	21.8	10	40	10.9	14	20
7-1/2	1,800	21.5	10	40	10.7	14	20
7-1/2	3,600	19.5	10	40	9.79	14	20
10	1,200	28.0	8	60	14.0	12	30
10	1,800	26.8	8	60	13.4	12	30
10	3,600	25.4	8	60	12.7	12	30
15	1,200	41.4	6	80	20.7	10	40
15	1,800	39.2	6	80	19.6	10	40
15	3,600	36.4	6	80	18.2	10	40
20	1,200	52.8	4	110	26.4	8	60
20	1,800	51.2	4	110	25.6	8	60
20	3,600	50.4	4	110	25.2	8	60

HP	Speed RPM	230-Volt Service			460-Volt Service		
		Full Load Amps	Wire Size	Fuse Amps	Full Load Amps	Wire Size	Fuse Amps
25	1,200	65.6	3	120	32.8	6	180
25	1,800	64.8	3	120	32.4	6	80
25	3,600	60.8	3	120	30.4	6	80
30	1,200	78.8	1	150	39.4	6	80
30	1,800	75.6	1	150	37.8	6	80
30	3,600	73.7	1	150	36.8	6	80
40	1,200	102	0	200	50.6	4	110
40	1,800	101	0	200	50.4	4	110
40	3,600	96.4	0	200	48.2	4	110
50	1,200	126	000	250	63.0	3	120
50	1,800	124	000	250	62.2	3	120
50	3,600	120	000	250	60.1	3	120
60	1,200	150	000	300	75.0	2	150
60	1,800	149	000	300	74.5	2	150
60	3,600	143	000	300	71.7	2	150
75	1,200	184	300	350	92.0	0	200
75	1,800	183	300	350	91.6	0	200
75	3,600	179	300	350	89.6	0	200
100	1,200	239	500	500	120	000	250
100	1,800	236	500	500	118	000	250
100	3,600	231	500	500	115	000	250
125	1,200	298	---	---	149	0000	300
125	1,800	293	---	---	147	0000	300
125	3,600	292	---	---	146	0000	300
150	1,200	350	---	---	174	300	350
150	1,800	348	---	---	174	300	350
150	3,600	343	---	---	174	300	350

For selecting ampere rating of heater coils for magnetic motor starters, select the standard coil closest to the rating on the motor nameplate. If motor operates in cold environment, the coil with next lower rating may be preferred. If in hot environment, the coil with next larger current rating may work better.

For additional information, see **Design Data Sheet 11**. See also **Design Data Sheet 33** and **Design Data Sheet 49** for effect of high and low voltage on electric motors. More detailed information on magnetic motor starters including wiring diagrams, will be found in the **Womack** book "*Electrical Control of Fluid Power*".

## TEMPERATURE CONVERSIONS - FAHRENHEIT AND CELSIUS

Enter one of the columns marked "Temp" with the temperature, either Fahrenheit or Celsius, which you wish to convert. If converting to Celsius, read the equivalent value in the column to the left. If converting to Fahrenheit, read the

equivalent value in the column to the right. The table was calculated from these formula:

$$^{\circ}\text{F} = [^{\circ}\text{C} \times 9/5] + 32, \text{ or,}$$

$$^{\circ}\text{C} = 5/9 \times [^{\circ}\text{F} - 32]$$

Enter one of these columns with the temperature you wish to convert

↓			↓			↓			↓		
Degree C	Temp.	Degree F	Degree C	Temp.	Degree F	Degree C	Temp.	Degree F	Degree C	Temp.	Degree F
-17.2	1	33.8	13.7	57	134.6	73.9	165	429	226.7	440	824
-16.6	2	35.6	14.3	58	136.4	76.7	170	338	232.2	450	842
-16.1	3	37.4	14.8	59	138.2	79.4	175	347	237.8	460	860
-15.5	4	39.2	15.6	60	140.0	82.2	180	356	243.3	470	878
-15.0	5	41.0	16.1	61	141.8	85.0	185	365	248.9	480	896
-14.4	6	42.8	16.6	62	143.6	87.8	190	374	254.4	490	914
-13.9	7	44.6	17.1	63	145.4	90.6	195	383	260.0	500	932
-13.3	8	46.4	17.7	64	147.2	93.3	200	392	265.6	510	950
-12.7	9	48.2	18.2	65	149.0	96.1	205	401	271.1	520	968
-12.2	10	50.0	18.8	66	150.8	98.9	210	410	276.7	530	986
-11.6	11	51.8	19.3	67	152.6	100	212	413	282.2	540	1,004
-11.1	12	53.6	19.9	68	154.4	101.6	215	419	287.8	550	1,022
-10.5	13	55.4	20.4	69	156.2	104.4	220	428	293.3	560	1,040
-10.0	14	57.2	21.0	70	158.0	107.2	225	437	298.9	570	1,058
-9.4	15	59.0	21.5	71	159.8	110.0	230	446	304.4	580	1,076
-8.8	16	60.8	22.2	72	161.6	112.8	235	455	310.0	590	1,094
-8.3	17	62.6	22.7	73	163.4	115.6	240	464	315.6	600	1,112
-7.7	18	64.4	23.3	74	165.2	118.3	245	473	321.1	610	1,130
-7.2	19	66.2	23.8	75	167.0	121.1	250	482	326.7	620	1,148
-6.6	20	68.0	24.4	76	168.8	123.9	255	491	332.2	630	1,166
-6.1	21	69.8	25.0	77	170.6	126.7	260	500	337.8	640	1,184
-5.5	22	71.6	25.5	78	172.4	129.4	265	509	343.3	650	1,202
-5.0	23	73.4	26.2	79	174.2	132.2	270	518	348.9	660	1,220
-4.4	24	75.2	26.8	80	176.0	135.0	275	527	354.4	670	1,238
-3.9	25	77.0	27.3	81	177.8	137.8	280	536	360.0	680	1,256
-3.3	26	78.8	27.7	82	179.6	140.6	285	545	365.6	690	1,274
-2.8	27	80.6	28.2	83	181.4	143.3	290	554	371.1	700	1,292
-2.2	28	82.4	28.8	84	183.2	146.1	295	563	376.7	710	1,310
-1.6	29	84.2	29.3	85	185.0	148.9	300	572	382.2	720	1,328
-1.1	30	86.0	29.9	86	186.8	151.7	305	581	387.8	730	1,346
-0.6	31	87.8	30.4	87	188.6	154.4	310	590	393.3	740	1,364
0	32	89.6	31.0	88	190.4	157.2	315	599	398.9	750	1,382
0.5	33	91.4	31.5	89	192.2	160.0	320	608	404.4	760	1,400
1.1	34	93.2	32.1	90	194.0	162.8	325	617	410.0	770	1,418
1.6	35	95.0	32.6	91	195.8	165.6	330	626	415.6	780	1,436
2.2	36	96.8	33.3	92	197.6	171.1	340	644	421.1	790	1,454
2.7	37	98.6	33.8	93	199.4	176.7	350	662	426.7	800	1,472
3.3	38	100.4	34.4	94	201.2	182.2	360	680	432.2	810	1,490
3.8	39	102.2	34.9	95	203.0	187.8	370	698	437.8	820	1,508
4.4	40	104.0	35.5	96	204.8	193.3	380	716	443.3	830	1,526
4.9	41	105.8	36.1	97	206.6	198.9	390	734	448.9	840	1,544
5.5	42	107.6	36.6	98	208.4	204.4	400	752	454.4	850	1,562
6.0	43	109.4	37.1	99	210.2	210.0	410	770	460.0	860	1,580
6.6	44	111.2	37.8	100	212.0	215.6	420	788	465.6	870	1,598
7.1	45	113.0	40.6	105	221.0	221.1	430	806	471.1	880	1,616
7.7	46	114.8	43.3	110	230.0						
8.2	47	116.6	46.1	115	239.0						
8.8	48	118.4	48.9	120	248.0						
9.3	49	120.2	51.7	125	257.0						
9.9	50	122.0	54.4	130	266.0						
10.4	51	123.8	57.2	135	275.0						
11.1	52	125.6	60.0	140	284.0						
11.5	53	127.4	62.8	145	293.0						
12.1	54	129.2	65.6	150	302.0						
12.6	55	131.0	68.3	155	311.0						
13.2	56	132.8	71.1	160	320.0						

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