Chapter 2

Mounting & Initial Startup

In This Chapter...

Safety Information

DANGER!

HAZARDOUS VOLTAGE! Before making any connection to the motor, disconnect all power to the motor.

WARNING: Any electrical or mechanical modification to this equipment without prior written consent of AutomationDirect.com, Inc. will void all warranties, may result in a safety hazard, and may void the $_{c}$CSA$_{us}$ listing.

WARNING: To avoid physical injury, keep your hands and clothing away from all moving parts.

Wiring Notes: PLEASE READ PRIOR TO INSTALLATION.

1. During installation, follow all local electrical, construction, and safety codes for the country in which the motor is to be installed.
2. Make sure the appropriate protective devices (circuit breaker or fuses) are connected between the power source and motor controller.
3. Make sure that the leads are connected correctly and the motor is properly grounded. (Ground resistance should not exceed 0.1 Ω.)
4. Use ground leads that comply with AWG/MCM standards and keep them as short as possible.
5. Make sure that the power source is capable of supplying the correct voltage and required current to the motor.

9. Do not attach or remove wiring when power is applied to the motor.

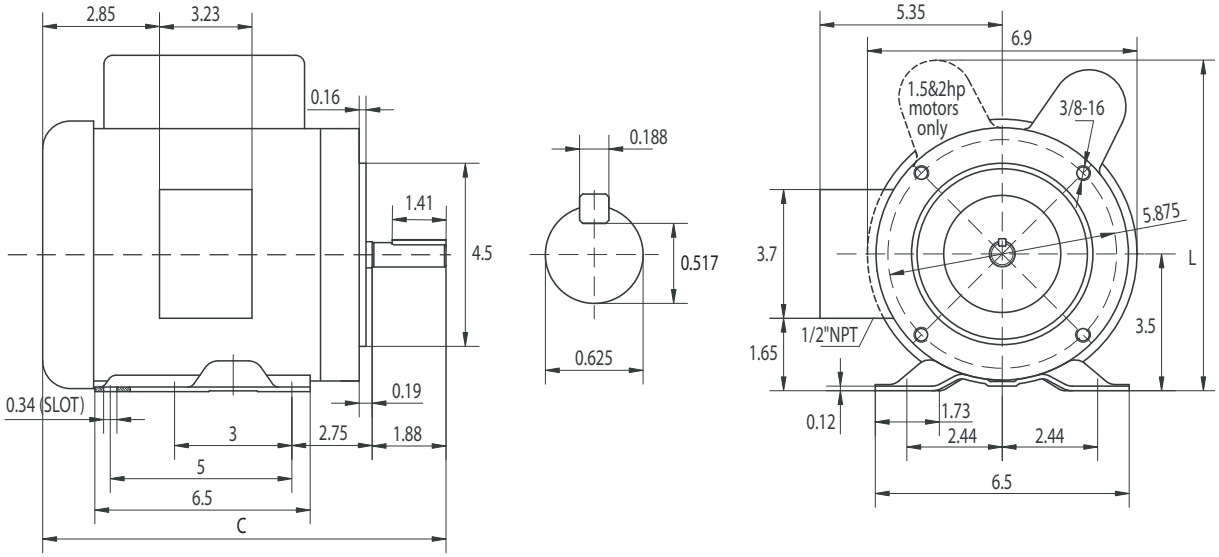
Applicable Codes

All IronHorse motors are $_{c}$CSA$_{us}$ listed, and therefore comply with the requirements of the National Electrical Code (NEC) and the Canadian Electrical Code (CEC).

Installation intended to meet the $_{c}$CSA$_{us}$ requirements must follow the instructions provided in the "Wiring Notes" as a minimum standard. Follow all local codes that exceed $_{c}$CSA$_{us}$ requirements. Refer to the technical data on the motor nameplate for electrical and performance data.

Motor Dimensions

56C Frame Single Phase



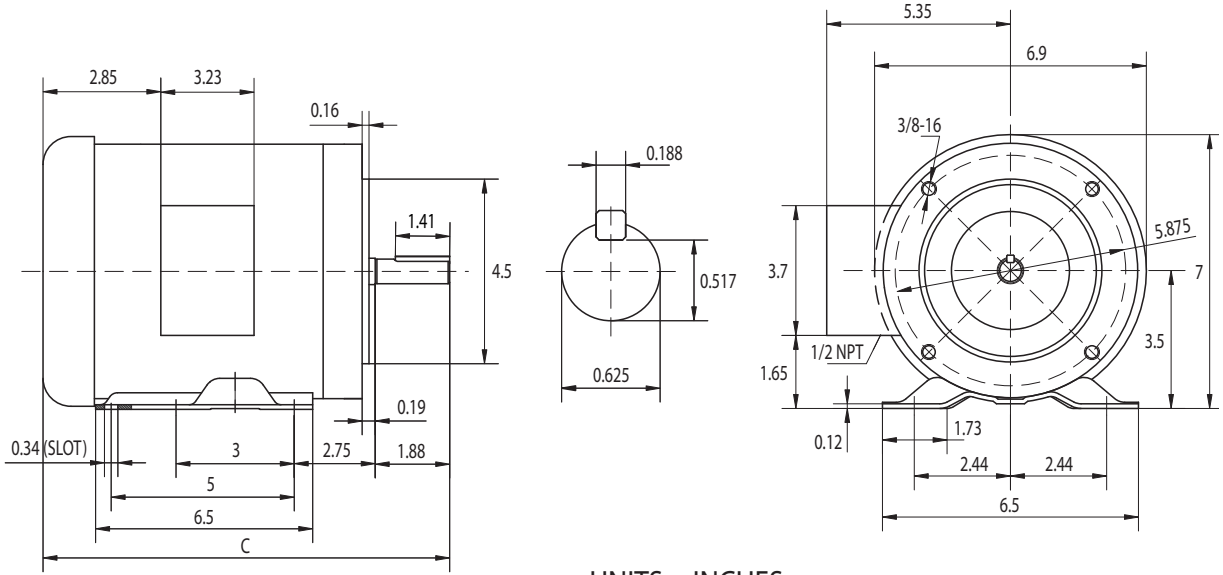
C = 12.4"; all except 1, 1.5 & 2 hp motors
C = 13"; 1 hp MTR-001-1AB18
C = 13.8"; 1.5hp MTR-1P5-1AB18
C = 14.6"; 2hp MTR-002-1AB18

UNITS = INCHES

MTR-xxx-1AB18 IronHorse Motors

L = 8.19"; all except 1.5 & 2 hp motors
L = 8.5"; 1.5 & 2 hp motors

56C Frame Three Phase

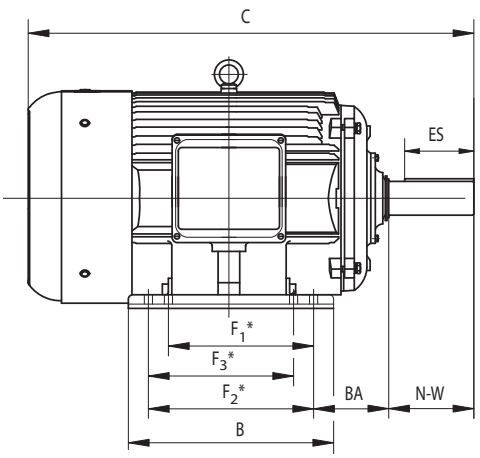


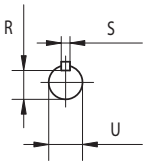
C = 12.2"; all except 1.5 & 2 hp motors
C = 12.6"; 1.5hp MTR-1P5-3BD18
C = 13.8"; 2hp MTR-002-3BD18

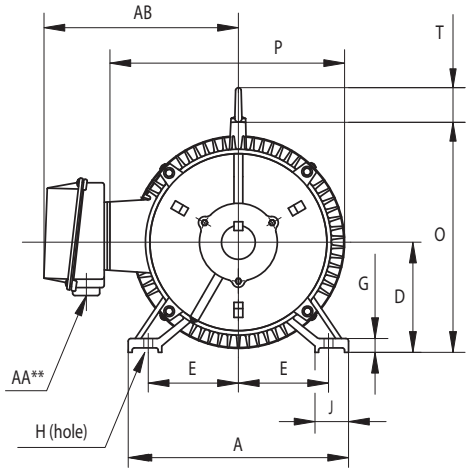
UNITS = INCHES

MTR-xxx-3BD18 IronHorse Motors

T Frame Three Phase Industrial Duty Motors







* Various frame sizes have 2, 3, or 4 mounting holes per mounting foot.

** F1 mounting shown.
** Some frame sizes are F1/F2 convertible.

Dimensions [inches, except as noted] - Three Phase T Frame Motors

Part Number	HP	NEMA Frame	A	AA**	AB	B	BA	C	D	E	ES
MTC-001-3BD18	1	143T	7	3/4″NPT	6.89	5	2.25	12.47	3.5	2.75	1.41
MTC-1P5-3BD18	1-1/2	145T				6		13.58			
MTC-002-3BD18	2										
MTC-003-3BD18	3	182T	9	1″ NPT	7.45	6.5	2.75	15.11	4.5	3.75	1.78
MTC-005-3BD18	5	184T				7.5		16.11			
MTC-7P5-3BD18	7-1/2	213T	10.5	1″ NPT	8.63	7.5	3.5	18.89	5.25	4.25	2.41
MTC-010-3BD18	10	215T				9		20.49			
MTC-015-3BD18	15	254T	12.5	1.5″ NPT	11.2	10.8	4.25	23.29	6.25	5	2.91
MTC-020-3BD18	20	256T				12.5		25.06			
MTC-025-3BD18	25	284T	14	1.5″ NPT	12	12.5	4.75	26.64	7	5.5	3.28
MTC-030-3BD18	30	286T				14		28.18			
MTC-040-3BD18	40	324T	16	2″ NPT	13.4	14	5.25	29.95	8	6.25	3.91
MTC-050-3BD18	50	326T				15.5		31.24			
MTC-060-3BD18	60	364T	18	3″ NPT	15.7	15.2	5.88	32.68	9	7	4.28
MTC-075-3BD18	75	365T				16.2		34.11			
MTC-100-3BD18	100	405T	20	3″ NPT	18.31	17.8	6.62	38.35	10	8	5.65
MTC-125-3BD18	125	444T	22	2x3″NPT	19.41	18.5	7.5	42.52	11	9	6.91
MTC-150-3BD18	150	445T				20.5		44.5			
MTC-200-3BD18	200	445/7T				24		48.03			
MTC-250-3D18	250	449T	21.3	2x3″NPT	19	30.5	7.5	55.27	11	9	6.91
MTC-300-3D18	300										

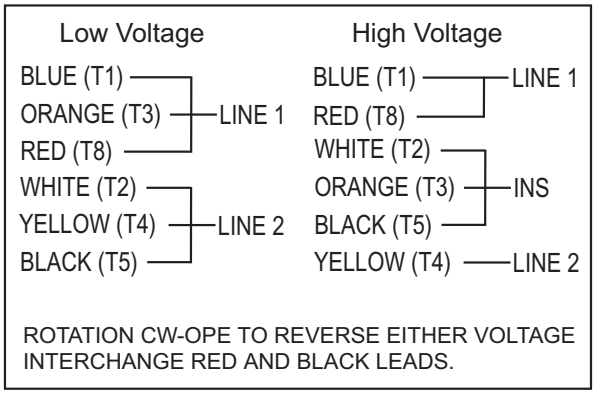
*** AA dimension is conduit fitting size.***

Dimensions [inches, except as noted] - Three Phase T Frame Motors (cont)													
Part Number	F1*	F2*	F3*	G	H	J	N-W	O	P	R	S	T	U
MTC-001-3BD18	n/a	4	n/a	0.512	0.34	1.45	2.25	7.08	7.16	0.771	0.188	n/a	0.875
MTC-1P5-3BD18	4	5	4										
MTC-002-3BD18													
MTC-003-3BD18	n/a	4.5	n/a	0.59	0.41	1.97	2.75	8.97	8.82	0.986	0.25	1.42	1.125
MTC-005-3BD18	4.5	5.5	4.5										
MTC-7P5-3BD18	n/a	5.5	n/a	0.709	0.41	2.36	3.38	10.53	10.4	1.201	0.312	1.73	1.375
MTC-010-3BD18	5.5	7	5.5										
MTC-015-3BD18	n/a	8.25	n/a	0.787	0.53	2.76	4	12.89	12.6	1.416	0.375	2.05	1.625
MTC-020-3BD18	8.25	10	8.25										
MTC-025-3BD18	n/a	9.5	n/a	0.866	0.53	2.76	4.62	14.28	14.17	1.591	0.5	2.05	1.875
MTC-030-3BD18	9.5	11	n/a										
MTC-040-3BD18	n/a	10.5	n/a	0.984	0.66	2.76	5.25	15.91	15.75	1.845	0.5	2.44	2.125
MTC-050-3BD18	10.5	12	n/a										
MTC-060-3BD18	n/a	11.25	n/a	1.102	0.66	2.95	5.88	18.13	17.7	2.021	0.625	2.44	2.375
MTC-075-3BD18	11.25	12.25	n/a										
MTC-100-3BD18	12.25	13.75	n/a	1.18	0.81	3.15	7.25	21.42	21.42	2.45	0.75	2.83	2.875
MTC-125-3BD18	n/a	14.5	n/a	1.38	0.81	3.35	8.5	22.97	23.43	2.88	0.875	3.46	3.375
MTC-150-3BD18	14.5	16.5	14.5										
MTC-200-3BD18	16.5	20	n/a										
MTC-250-3D18	n/a	25	n/a	1.575	0.827	3.35	8.5	23	23.62	2.88	0.875	4.25	3.375
MTC-300-3D18													

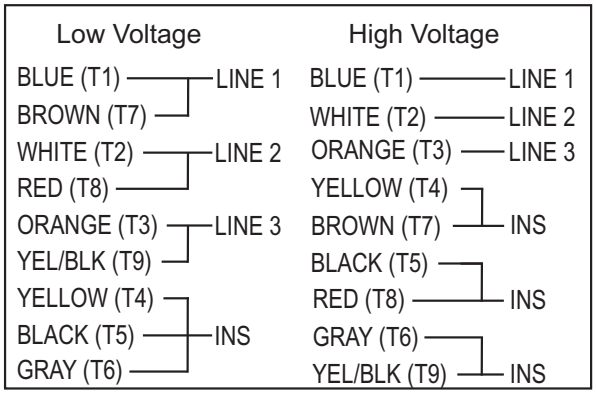
** Various frame sizes have 2, 3, or 4 mounting holes per mounting foot.*
F1 mounting shown; some frame sizes are F1/F2 convertible; refer to T Frame "Motor Specifications" table. (F2 mounting = conduit entrance on right side facing shaft.)

Terminal Diagrams

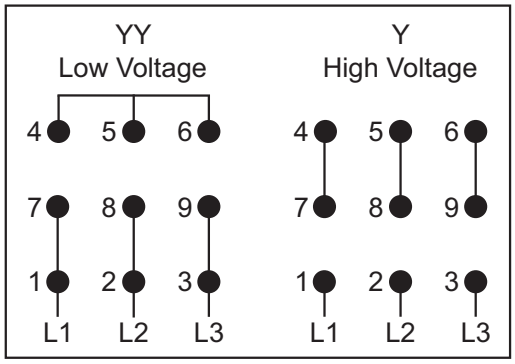
1/3 hp - 2hp 1Ø models
6-Lead, 115/208-230 VAC



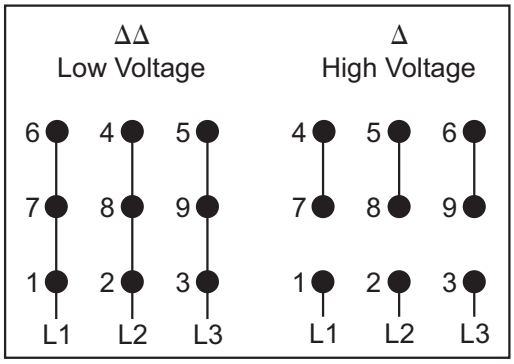
1/3 hp - 2hp 3Ø models
9-Lead, 208-230/460 VAC



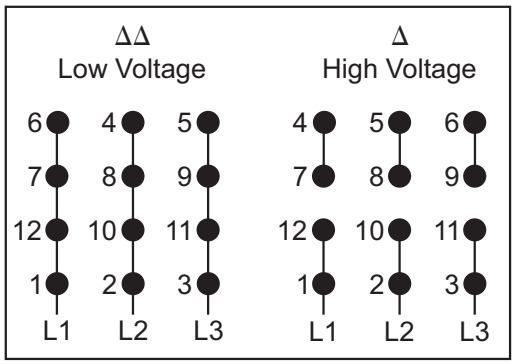
1hp - 5hp models
9-Lead, 208-230/460 VAC



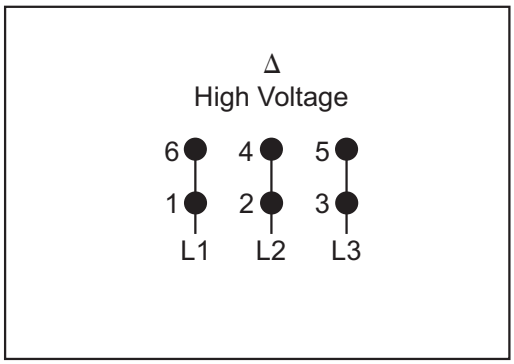
7.5 hp - 20 hp models
9-Lead, 208-230/460 VAC



25 hp - 200 hp models
12-Lead, 208-230/460 VAC



250 hp - 300 hp models
6-Lead, 460 VAC

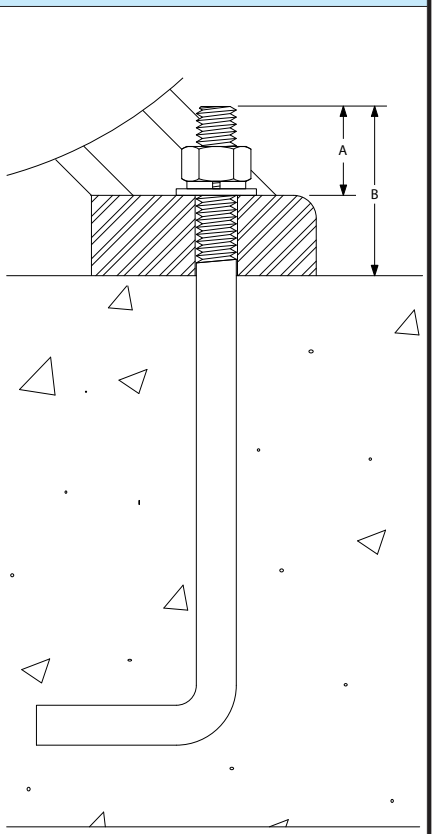


Motor Mounting

IronHorse motors should be properly mounted to prevent premature motor and / or bearing failure. When necessary, use motor shims to level the motor at all mounting bolt holes. Use proper diameter bolts of the highest grade material available for the application. Use the chart below to select the correct size bolt for each frame size.

A mounted motor must operate vibration free. Each motor installation should be checked for potential vibration situations. On motors 100 hp and up, it is recommended that foundation studs be used to secure the motor or slide base. Base shims should also be used when necessary for level mounting.

Motor Mounting Bolt Sizes

Frame Size	Bolt Diameter	Minimum Useable Thread Length (A)	Minimum Exposed Anchor Length (B)	
56 143T 145T	5/16″	.45″	.88″	
182T 184T 213T 215T	3/8″	.53″	1.50″	
254T 256T	1/2″	.69″″	1.44″	
284T 286T			1.69″	
324T 326T	5/8″	.85″	2.19″	
364T 365T			2.06″	
404T 405T 444T 445T	3/4″	.95″	2.50″	
447T 449T			3.00″	

STABLE™ Slide Bases

AutomationDirect offers STABLE slide bases for simple mounting of any NEMA standard frame motor. STABLE slide bases are manufactured from heavy-duty steel and allow motor position adjustment when mounting any NEMA framed motor. See Chapter 4 for complete details.

Proper Installation Conditions

Care should be taken to make sure that an IronHorse motor is mounted at least thirty inches from a wall or structure that would prevent proper ventilation of the motor. The installation area should be free of dust and smoke particles. Any air contaminate could inhibit proper operation of the motor fan.

If an IronHorse motor is to be installed in a high altitude or in a low temperature location, use the Altitude / Ambient Temperature Derating chart below for proper motor sizing.

Altitude / Ambient Temperature Derating Chart

Temperature - °C (°F) \ Altitude - Meters (Feet) Above Sea Level	1000 (3281)	1500 (4921)	2000 (6562)	2500 (8202)	3000 (9842)	3500 (11,483)	4000 (13,123)
10 °C (50 °F)							1.50
15 °C (59 °F)						1.05	0.99
20 °C (68 °F)					1.05	0.99	0.93
25 °C (77 °F)				1.05	0.98	0.93	0.88
30 °C (86 °F)			1.05	0.97	0.92	0.87	0.82
40 °C (104 °F)	1.00	0.94	0.89	0.85	0.80	0.76	0.72
50 °C (122 °F)	0.85	0.8	0.76	0.72	0.68	0.65	0.62
60 °C (140 °F)	0.71	0.67	0.64	0.60	0.57	0.55	0.52

Example : 100 hp @ 60 °C and 2000 Meters
100 / 0.64 = 156 hp
The motor should be a 200 hp motor.

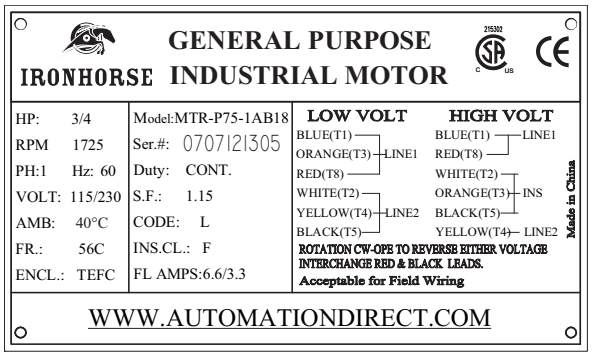
Coupling Alignment

Correct coupling alignment is very important to the life of the motor. Coupling misalignment is the major cause of motor bearing failure. In belt driven applications, pulleys should be installed correctly. Belt tension, alignment and wear should be checked at installation and at regular maintenance intervals. Install motor couplings per the manufacturers instructions. Whenever possible, direct couple or flange mount IronHorse motors in their application. Doing so can extend the bearing life greatly.

AutomationDirect offers C-face mounting kits for all T-frame IronHorse motors. For a complete list of mounting kits see Chapter 4.

Motor Nameplate & Starter Information

Below is an example of the typical IronHorse motor nameplate.



Motor Starter Information

IronHorse general purpose motors can be controlled by across-the-line starters such as contactors and manual motor starters. Under certain circumstances, three phase IronHorse motors can also be controlled by AC drives. For more information about using AC drives with IronHorse motors see Chapter 5.

Use the following chart to help determine the appropriate across-the-line starter.

Starting System Information					
Frame Size	**Number of Internal Leads**	**Internal Lead Size**	**Internal Lead Length**	**Voltage**	**Winding Type**
56C (1Ø)	6	16 AWG	6″	115/208-230	N/A
56C (3Ø)	9	16 AWG	9-1/2″	208-230/460	Wye
143T					
145T					
182T					
184T					
213T					Delta
215T		14 AWG			
254T		12 AWG			
256T					
284T	12	10 AWG	10-5/8″		Wye / Delta
286T					
324T		8 AWG	13″		
326T					
364T		6 AWG			
365T					
404T		4 AWG	13-3/4″		
405T					
444T		3 AWG			
445T					
447T					
449T	6	1 AWG	14″	460	

Locked Rotor Amps

All electrical components used in an IronHorse motor installation must be able to handle the maximum current draw of the motor. When using a typical across-the-line starter, current is highest when power is first applied to the motor. This is commonly referred to as locked rotor amps. Every IronHorse motor has a locked rotor amperage code letter stamped on the motor nameplate either as "CODE" or "kVA Code". This letter applies to the locked rotor amp range value. See the T-frame motor "Performance Data" table in Chapter 1 for specific locked rotor amperage information.

Inspection Before Startup

1. Remove the shaft lock device if the motor was supplied with one.
2. Turn the shaft by hand and make sure the shaft turns freely. Listen for any unusual noises and feel for any interruption in the shaft as it turns.
3. In all motors with serviceable bearings, check the grease level on drive end and opposite drive end bearings. Make sure the bearing cavities are filled with Exxon POLYREX® EM Polyurea grease to the proper running level.
4. Perform a final check on the installation of all parts in the assembly. Check the motor mounting bolts, coupling, belt drive, C-face mount, alignment, etc.
5. Verify all electrical connections for the motor and starter. Refer to the motor diagram on the motor nameplate. Make sure all terminal screws are tightened properly.
6. Make sure that all electrical components used in the installation are rated for the locked rotor amperage.
7. Make sure the motor is properly grounded. Use the grounding lug provided in the motor terminal box or on the mounting foot.

Initial Startup Inspection

1. At initial startup monitor the start-up voltage and the running voltage of the motor. The full load voltage should never exceed the line voltage on the motor nameplate multiplied by the service factor of the motor.
   Example: 230 VAC x 1.15 = 264.5 VAC.
2. Check the full load running amperage of the motor. The full load running amperage should not be more than the amount indicated on the motor nameplate
3. Listen for any unusual noises at motor start-up and in the first hour of operation. Listen for any unusual bearing noise in the drive end and opposite drive end of the motor. Abnormal bearing noise can be an indication of a defective bearing or the motor grease could be low. If there is abnormal noise in motors with serviceable bearings, shut down the motor and check the grease level on both the drive end and opposite drive end.

Do not over grease the bearings. Over greasing motor bearings is a common cause of motor failure.

Large horsepower motors with roller bearings will typically be noisier than ball bearing motors at initial motor start-up and in normal operation.