

MOUNTING & INITIAL STARTUP



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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 $cCSA_{US}$ 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 0.1Ω .)
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.
6. Do not attach or remove wiring when power is applied to the motor.

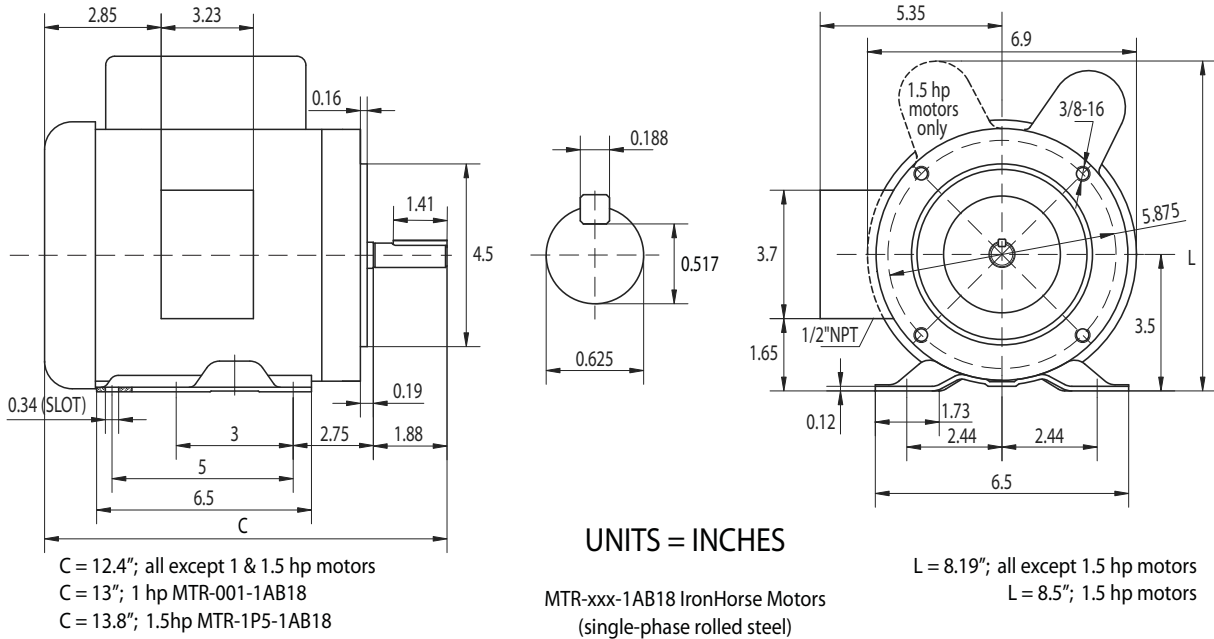
Applicable Codes

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

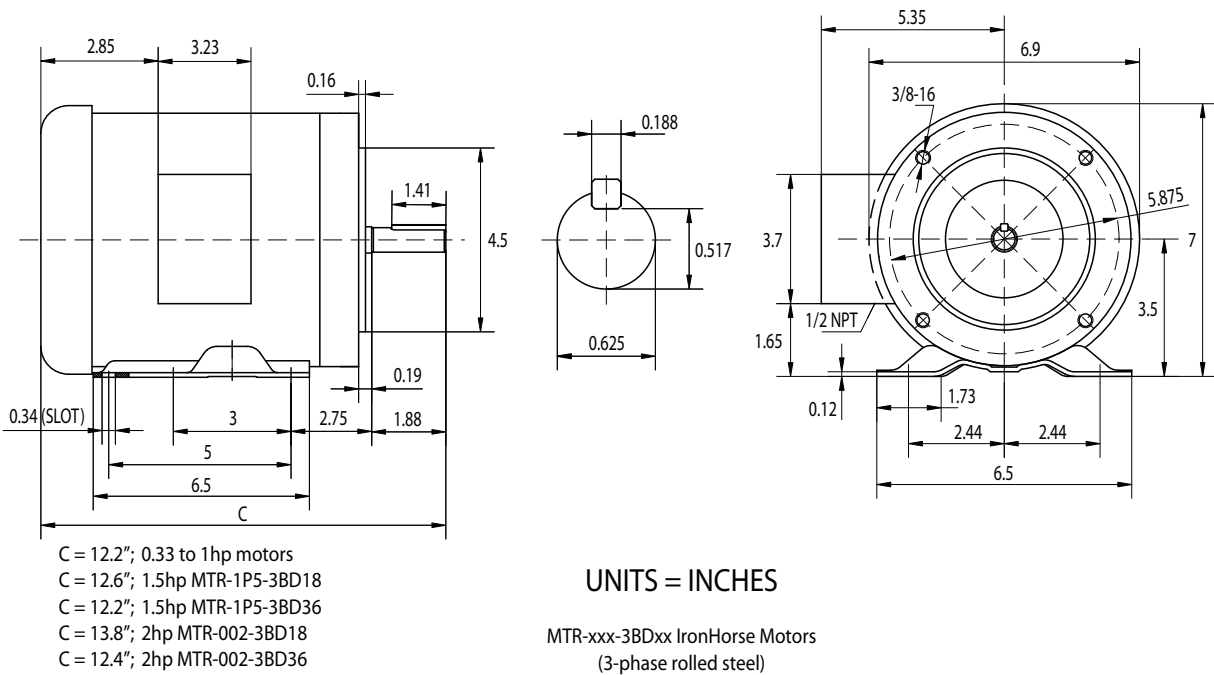
Installation intended to meet the $cCSA_{US}$ requirements must follow the instructions provided in the "Wiring Notes" as a minimum standard. Follow all local codes that exceed $cCSA_{US}$ requirements. Refer to the technical data on the motor nameplate for electrical and performance data.

Motor Dimensions

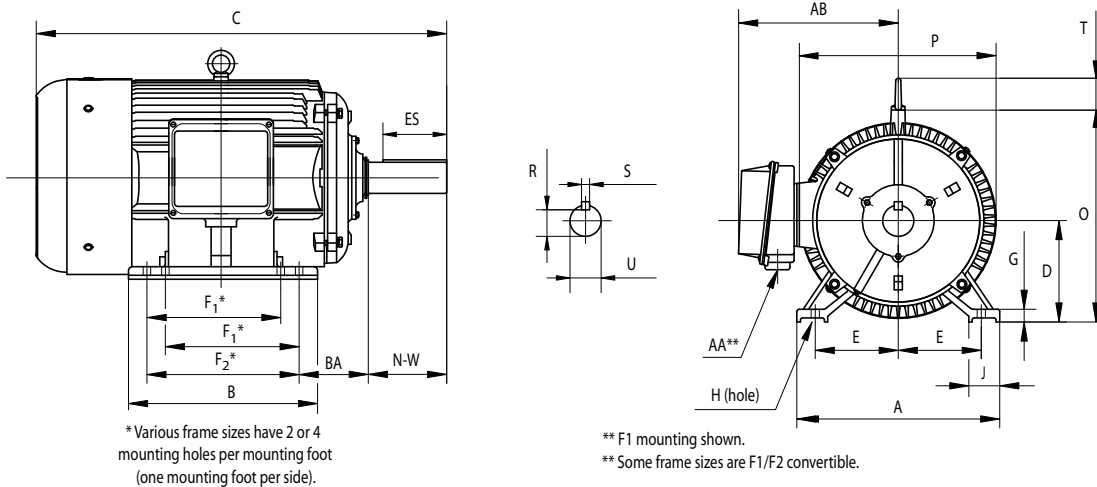
56C-Frame Single-phase Motor Dimensions



56C-Frame Three-phase Motor Dimensions



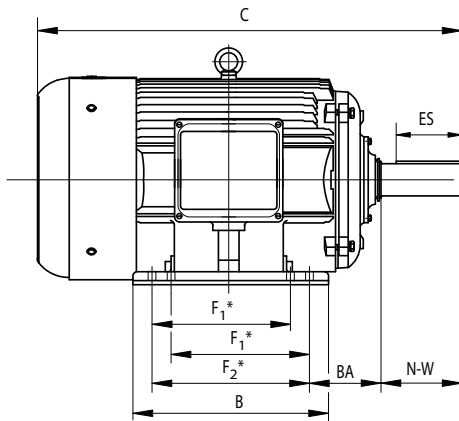
T-Frame Three-phase Motor Dimensions



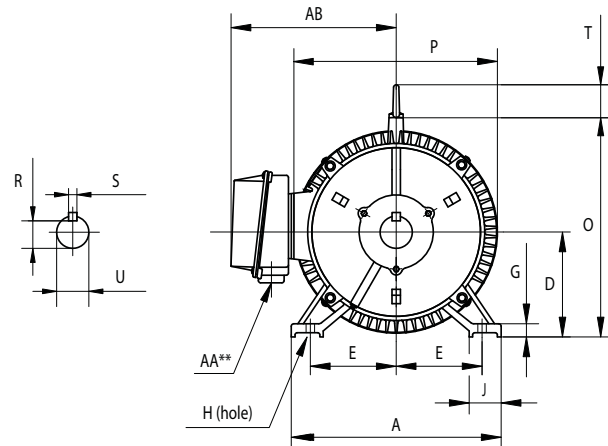
Dimensions [inches, except as noted] Three-phase T Frame Motors – 1200, 1800, 3600 rpm											
Part Number	HP	NEMA Frame	A	AA**	AB	B	BA	C	D	E	ES
MTC-001-3BD12	1	145T	7	3/4" npt	6.89	6	2.25	13.58	3.5	2.75	1.41
MTC-001-3BD18		143T				5		12.57			
MTC-1P5-3BD12	1-1/2	182T	9	1" NPT	7.45	6.5	2.75	15.11	4.5	3.75	1.78
MTC-1P5-3BD18		145T	7	3/4" npt	6.89	6	2.25	13.58	3.5	2.75	1.41
MTC-1P5-3BD36		143T	5	12.57							
MTC-002-3BD12	2	184T	9	1" NPT	7.45	7.5	2.75	16.11	4.5	3.75	1.78
MTC-002-3BD18		145T	7	3/4" npt	6.89	6	2.25	13.58	3.5	2.75	1.41
MTC-002-3BD36		143T	5	12.57							
MTC-003-3BD12	3	213T	10.5	1" NPT	8.63	7.5	3.5	18.89	5.25	4.25	2.41
MTC-003-3BD18		182T	9	1" NPT	7.45	6.5	2.75	15.11	4.5	3.75	1.78
MTC-003-3BD36		143T	5	12.57							
MTC-005-3BD12	5	215T	10.5	1" NPT	8.63	9	3.5	20.49	5.25	4.25	2.41
MTC-005-3BD18		184T	9	1" NPT	7.45	7.5	2.75	16.11	4.5	3.75	1.78
MTC-005-3BD36		143T	5	12.57							
MTC-7P5-3BD12	7-1/2	254T	12.5	1.5" NPT	11.2	10.8	4.25	23.29	6.25	5	2.91
MTC-7P5-3BD18		213T	10.5	1" NPT	8.63	7.5	3.5	18.89	5.25	4.25	2.41
MTC-7P5-3BD36		143T	5	12.57							
MTC-010-3BD12	10	256T	12.5	1.5" NPT	11.2	12.5	4.25	25.06	6.25	5	2.91
MTC-010-3BD18		215T	10.5	1" NPT	8.63	9	3.5	20.49	5.25	4.25	2.41
MTC-010-3BD36		143T	5	12.57							

* Various frame sizes have 2 or 4 mounting holes per mounting foot.
** AA dimension is conduit fitting size.
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.)
**** Table Continued Next Page for 1-10 hp T-frame Motors; 1200, 1800, 3600 rpm ****

T-Frame Three-phase Motor Dimensions (continued)



* Various frame sizes have 2 or 4 mounting holes per mounting foot (one mounting foot per side).

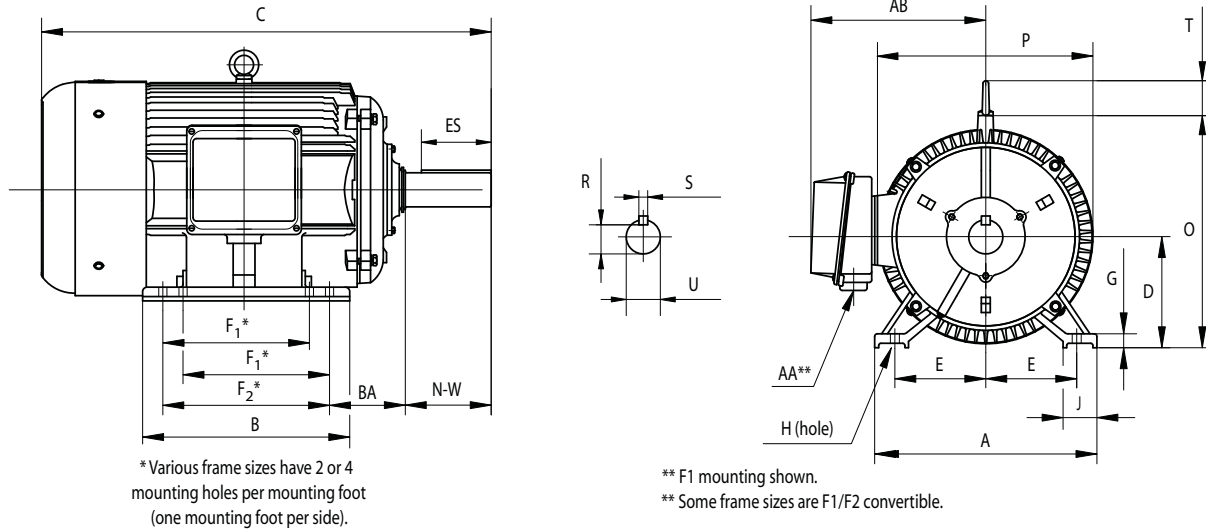


** F1 mounting shown.
** Some frame sizes are F1/F2 convertible.

Dimensions [inches, except as noted] (continued)												
Three-phase T Frame Motors – 1200, 1800, 3600 rpm												
Part Number	F1*	F2*	G	H	J	N-W	O	P	R	S	T	U
MTC-001-3BD12	4	5	0.512	0.34	1.45	2.25	7.08	7.16	0.771	0.188	0.88	0.875
MTC-001-3BD18	n/a	4									n/a	
MTC-1P5-3BD12	n/a	4.5	0.59	0.41	1.97	2.75	8.97	8.82	0.986	0.25	1.42	1.125
MTC-1P5-3BD18	4	5	0.512	0.34	1.45	2.25	7.08	7.16	0.771	0.188	n/a	0.875
MTC-1P5-3BD36	n/a	4										
MTC-002-3BD12	4.5	5.5	0.59	0.41	1.97	2.75	8.97	8.82	0.986	0.25	1.42	1.125
MTC-002-3BD18	4	5	0.512	0.34	1.45	2.25	7.08	7.16	0.771	0.188	n/a	0.875
MTC-002-3BD36											0.88	
MTC-003-3BD12	n/a	5.5	0.709	0.41	2.36	3.38	10.53	10.4	1.201	0.312	1.73	1.375
MTC-003-3BD18	n/a	4.5	0.59	0.41	1.97	2.75	8.97	8.82	0.986	0.25	1.42	1.125
MTC-003-3BD36												
MTC-005-3BD12	5.5	7	0.709	0.41	2.36	3.38	10.53	10.4	1.201	0.312	1.73	1.375
MTC-005-3BD18	4.5	5.5	0.59	0.41	1.97	2.75	8.97	8.82	0.986	0.25	1.42	1.125
MTC-005-3BD36												
MTC-7P5-3BD12	n/a	8.25	0.787	0.53	2.76	4	12.89	12.6	1.416	0.375	2.05	1.625
MTC-7P5-3BD18	n/a	5.5	0.709	0.41	2.36	3.38	10.53	10.4	1.201	0.312	1.73	1.375
MTC-7P5-3BD36												
MTC-010-3BD12	8.25	10	0.787	0.53	2.76	4	12.89	12.6	1.416	0.375	2.05	1.625
MTC-010-3BD18	5.5	7	0.709	0.41	2.36	3.38	10.53	10.4	1.201	0.312	1.73	1.375
MTC-010-3BD36												

* Various frame sizes have 2 or 4 mounting holes per mounting foot.
** AA dimension is conduit fitting size.
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.)
**** Table Continued Next Page for 15–300 hp T-frame Motors; 1800 rpm ****

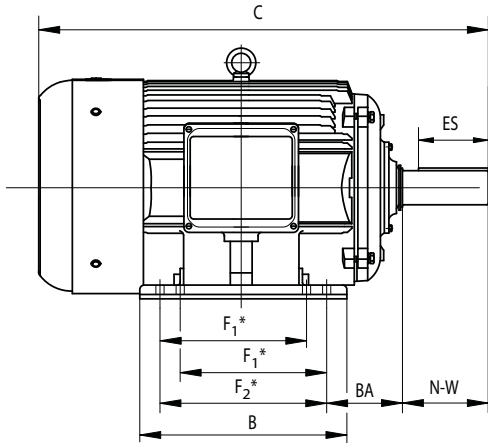
T-Frame Three-phase Motor Dimensions (continued)



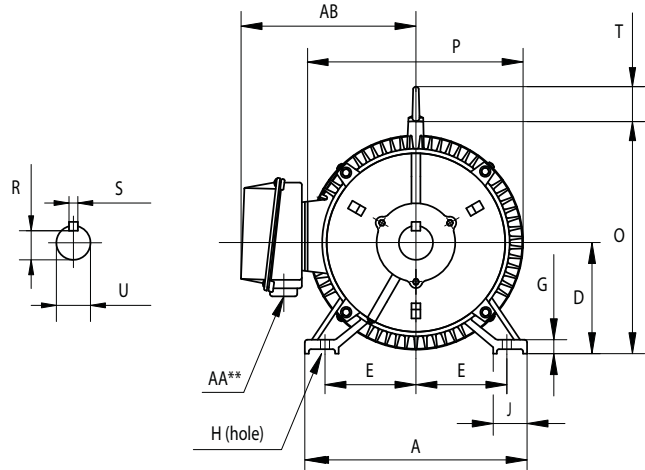
Dimensions [inches, except as noted] (continued)											
Three-phase T Frame Motors – 1800 rpm											
Part Number	HP	NEMA Frame	A	AA**	AB	B	BA	C	D	E	ES
MTC-015-3BD18	15	254T	12.5	1.5" NPT	11.2	10.8	4.25	23.29	6.25	5	2.91
MTC-020-3BD18	20	256T				12.5		25.06			
MTC-025-3BD18	25	284T	14	1.5" NPT	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	22	2x3"NPT	19.07	31	7.5	55.51	11	9	7.01
MTC-300-3D18	300										

* Various frame sizes have 2 or 4 mounting holes per mounting foot.
** AA dimension is conduit fitting size.
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.)
**** Table Continued Next Page for 15–300 hp T-frame Motors; 1800 rpm ****

T-Frame Three-phase Motor Dimensions (continued)



* Various frame sizes have 2 or 4 mounting holes per mounting foot (one mounting foot per side).

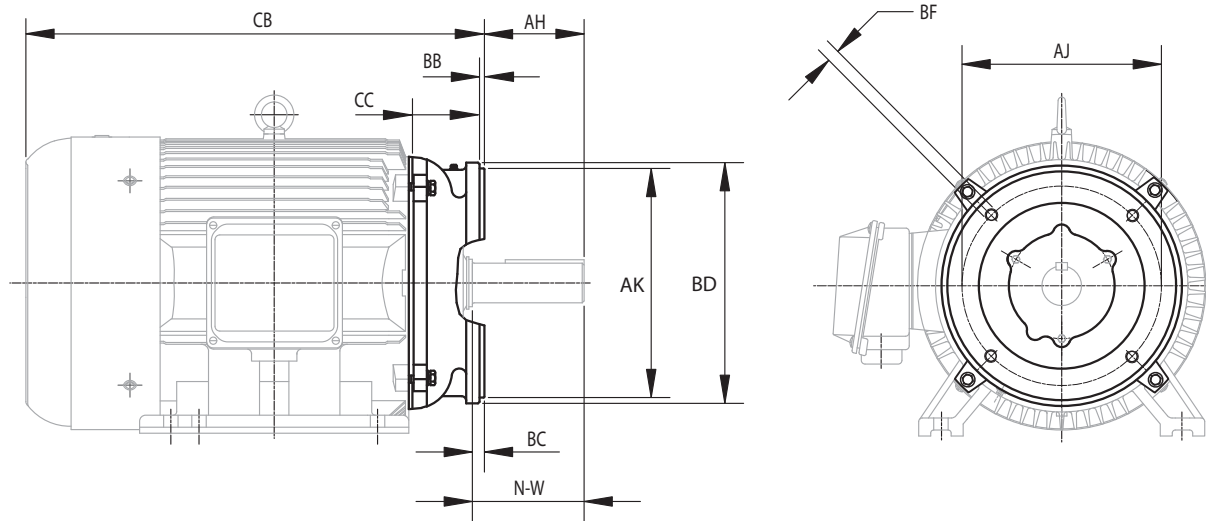


** F1 mounting shown.
** Some frame sizes are F1/F2 convertible.

Dimensions [inches, except as noted] (continued)												
Three-phase T Frame Motors – 1800 rpm												
Part Number	F1*	F2*	G	H	J	N-W	O	P	R	S	T	U
MTC-015-3BD18	n/a	8.25	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										
MTC-025-3BD18	n/a	9.5	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										
MTC-040-3BD18	n/a	10.5	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										
MTC-060-3BD18	n/a	11.25	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										
MTC-100-3BD18	12.25	13.75	1.18	0.81	3.15	7.25	21.02	21.42	2.45	0.75	2.83	2.875
MTC-125-3BD18	n/a	14.5	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										
MTC-200-3BD18	16.5	20										
MTC-250-3D18	n/a	25	1.575	0.81	3.35	8.5	23	24	2.88	0.875	4.25	3.375
MTC-300-3D18												

* Various frame sizes have 2 or 4 mounting holes per mounting foot.
** AA dimension is conduit fitting size.
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.)

TC-Frame Three-phase Motor & C-Flange Dimensions



TC-frame motors are T-frame motors with C-flange accessory kits installed.
For more information about the C-flange accessory kits, refer to Chapter 4: Accessories.

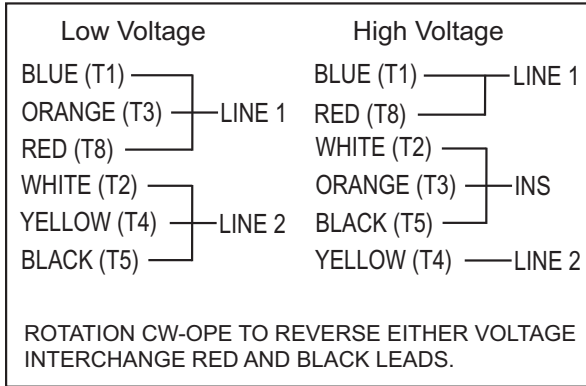
Dimensions (inches) - T-Frame Motor C-Flange Kits											
Part Number	Frame	AH ⁽²⁾	AJ	AK	BB	BC ⁽²⁾	BD	BF	CB ⁽²⁾	CC	N-W ⁽²⁾
MTA-CFACE-140TC ⁽¹⁾	143T	1.96	5.875 ⁽¹⁾	4.5 ⁽¹⁾	0.16	0.12	6.5	3/8-16	10.51	1.43	2.25
	145T								11.62		
MTA-CFACE-180TC	182T	2.62	7.25	8.5	0.25	0.12	9	1/2-13	12.49	1.17	2.75
	184T								13.49		
MTA-CFACE-210TC	213T	3.12	7.25	8.5	0.25	0.25	9	1/2-13	15.77	1.45	3.38
	215T								17.37		
MTA-CFACE-250TC	254T	3.75	7.25	8.5	0.25	0.25	10	1/2-13	19.54	2.89	4
	256T								21.31		
MTA-CFACE-280TC	284T	4.38	9	10.5	0.25	0.25	11.25	1/2-13	22.26	3.26	4.62
	286T								23.80		
MTA-CFACE-320TC	324T	5	11	12.5	0.25	0.25	14	5/8-11	24.95	3.67	5.25
	326T								26.24		
MTA-CFACE-360TC	364T	5.62	11	12.5	0.25	0.25	14	5/8-11	27.06	4.06	5.88
	365T								28.49		
MTA-CFACE-400TC	405T	7	11	12.5	0.25	0.25	15.5	5/8-11	31.35	4.33	7.25
MTA-CFACE-444TC	444T	8.25	14	16	0.25	0.25	18	5/8-11	34.27	4.11	8.5
	445T								36.25		
MTA-CFACE-447TC	445/7T	8.25	14	16	0.25	0.25	18	5/8-11	39.78	4.11	8.5
MTA-CFACE-449TC	449T	8.248	14	16	0.26	0.26	17.72	5/8-11	47.26	4.35	8.5

1) Mounting bolt holes for MTA-CFACE-140TC are located outside of the highest C-face flange surface (dimension AJ > AK).

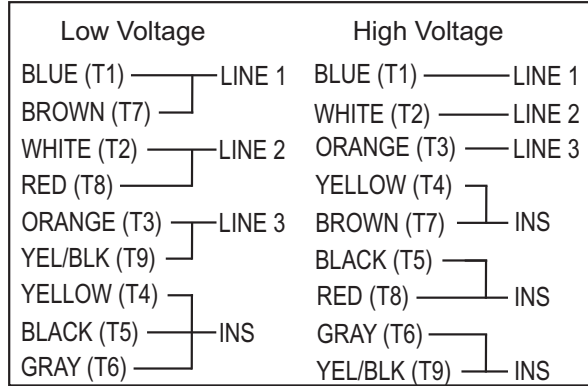
2) Motor dependent dimensions apply only to IronHorse MTC-xxx-xxxxx(CK) motors.

Terminal Diagrams

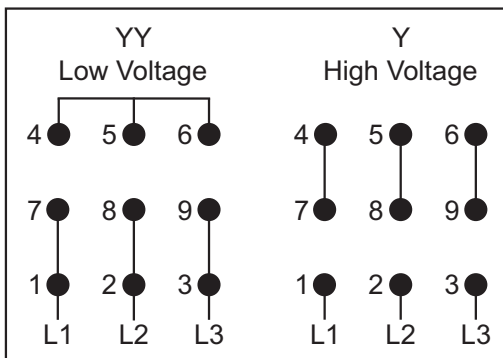
1/3 hp - 1.5hp 1Ø models
6-Lead, 115/208-230 VAC



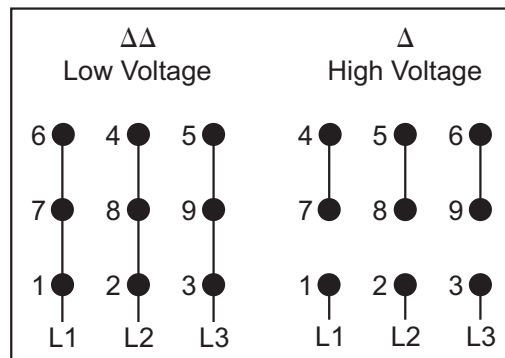
1/3 hp - 2hp 3Ø models
9-Lead, 208-230/460 VAC



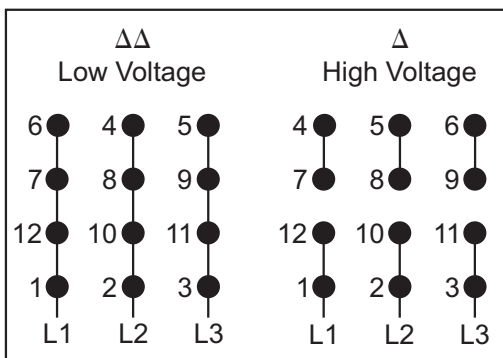
1hp - 5hp models
9-Lead, 208-230/460 VAC



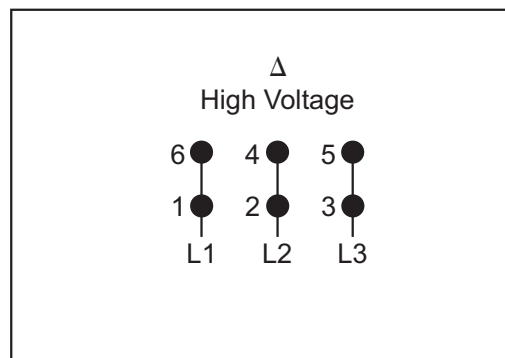
7.5 hp - 20 hp models
9-Lead, 208-230/460 VAC



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, we recommend 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	5/16"	.45"	.88"	
143T				
145T				
182T				
184T	3/8"	.53"	1.50"	
213T				
215T				
254T				
256T	1/2"	.69"	1.44"	
284T			1.69"	
286T				
324T	5/8"	.85"	2.19"	
326T			2.06"	
364T				
365T				
404T	3/4"	.95"	2.50"	
405T				
444T			3.00"	
445T				
447T				
449T				

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 (Accessories) 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								
		Altitude - Meters (Feet) Above Sea Level						
		1000 (3281)	1500 (4921)	2000 (6562)	2500 (8202)	3000 (9842)	3500 (11,483)	4000 (13,123)
Temperature - °C (°F)	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.

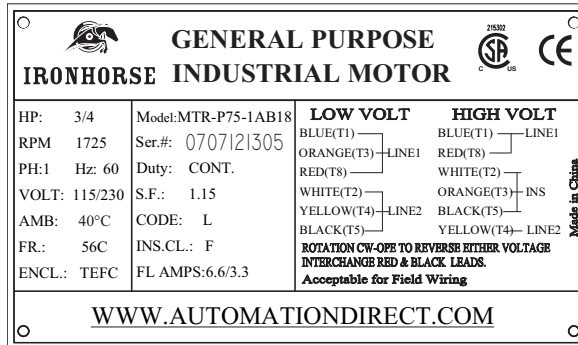
Coupling Alignment

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 (Accessories).

Motor Nameplate & Starter Information

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. Refer to Chapter 5 (Reference) for more information about using AC drives with IronHorse motors.

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 in	115/208-230	N/A	
56C (3Ø)	9		9-1/2 in		208-230/460	Wye
143T – 145T						Delta
182T – 184T						
213T						
215T	14 AWG	12	10-5/8 in	460	Wye / Delta	
254T – 256T	12 AWG					
284T – 286T	10 AWG					
324T – 326T	8 AWG					13 in
364T – 365T	6 AWG					
404T – 405T	4 AWG					
444T – 445T	3 AWG					13-3/4 in
447T						
449T	6	1 AWG	14 in	460		

* TC-frame motors have the same starting system characteristics as the comparable T-frame motors.

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 (Getting Started) 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: $230 \text{ VAC} \times 1.15 = 264.5 \text{ VAC}$.
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.
