

# AutomationDirect AC Motors Selection Overview

## EPAct, High and Premium Efficiency What does it all mean?

### EPAct (1992)

In 1992, the U.S. Congress passed legislation requiring that general purpose Design A & B motors meet minimum efficiency requirements, and this legislation was called the Energy Policy Act of 1992. Previously, there had been no U.S. standards set forth for motor energy efficiency. Since 1997 (when EPAct '92 was first enforced), two-, four-, and six-pole general purpose Design A & B motors had to meet EPAct guidelines. Since then, most general purpose motors manufactured and/or sold in the U.S. have met these requirements.

### Premium Efficiency (EISA 2007)

In December 2010, a new level of energy efficiency mandate went into effect. The Energy Independence and Security Act of 2007 mandated that all AC industrial motors as described below must meet Premium Efficiency standards. The NEMA trade group was instrumental in getting this legislation passed, so many people refer to the high efficiency motors by their nickname – NEMA Premium®. All applicable motors manufactured or imported into the U.S. after December 2010 must meet the Premium Efficiency guidelines.

Motors Covered Under EISA 2007 (Premium Efficiency Mandate)	
<b>Included – must meet the new Premium Efficiency standards – Industrial AC electric squirrel-cage general-purpose motors as follows:</b>	
Single speed; Polyphase; 1–200 hp with 3-digit frame sizes; 2, 4, & 6 pole (3600, 1800, & 1200 rpm); NEMA design A & B (including IEC equivalent); Continuous rated	
<b>Not Included in Premium Efficiency standards, but must now meet EPAct standards:</b>	
JM; JP; Round body (footless); 201–500 hp; Fire pump; U-frame; Design C; 8-pole	
<i>Certain motors (Inverter/Vector Duty, NEMA design D, etc.) are not covered by EISA 2007.</i>	
<i>For full text, visit <a href="http://www.energy.senate.gov">www.energy.senate.gov</a> and click "ENERGY INDEPENDENCE &amp; SECURITY ACT OF 2007".</i>	

Nominal Full-Load Efficiency Standards Comparisons (%)						
Enclosed Electric Motors, Random Wound, 60 Hz, 600V or Less						
Motor HP	1200 rpm [6-pole]		1800 rpm [4-pole]		3600 rpm [2-pole]	
	EPAct	Premium Efficiency	EPAct	Premium Efficiency	EPAct	Premium Efficiency
1	80.0	82.5	82.5	85.5	75.5	77.0
1.5	85.5	87.5	84.0	86.5	82.5	84.0
2	86.5	88.5	84.0	86.5	84.0	85.5
3	87.5	89.5	87.5	89.5	85.5	86.5
5	87.5	89.5	87.5	89.5	87.5	88.5
7.5	89.5	91.0	89.5	91.7	88.5	89.5
10	89.5	91.0	89.5	91.7	89.5	90.2
15	90.2	91.7	91.0	92.4	90.2	91.0
20	90.2	91.7	91.0	93.0	90.2	91.0
25	91.7	93.0	92.4	93.6	91.0	91.7
30	91.7	93.0	92.4	93.6	91.0	91.7
40	93.0	94.1	93.0	94.1	91.7	92.4
50	93.0	94.1	93.0	94.5	92.4	93.0
60	93.6	94.5	93.6	95.0	93.0	93.6
75	93.6	94.5	94.1	95.4	93.0	93.6
100	94.1	95.0	94.5	95.4	93.6	94.1
125	94.1	95.0	94.5	95.4	94.5	95.0
150	95.0	95.8	95.0	95.8	94.5	95.0
200	95.0	95.8	95.0	96.2	95.0	95.4

# AutomationDirect AC Motors Selection Overview

## General-purpose or inverter-duty motor?

### How to choose a general purpose motor vs. an inverter-duty motor

General purpose motors have been around for many years. They are the workhorse of almost every industry. An inverter-duty motor is a much newer concept that was necessary as general purpose motors began to be driven by VFDs (inverters or AC drives). An inverter duty motor can withstand the higher voltage spikes produced by all VFDs (amplified at longer cable lengths) and can run at very slow speeds without overheating. This performance comes at a cost: inverter-duty motors can be much more expensive than general purpose motors. Guidelines for choosing an IronHorse general purpose motor vs. an inverter-duty motor are given below. If your application falls within the guidelines below, there is no need to apply an inverter-duty motor.

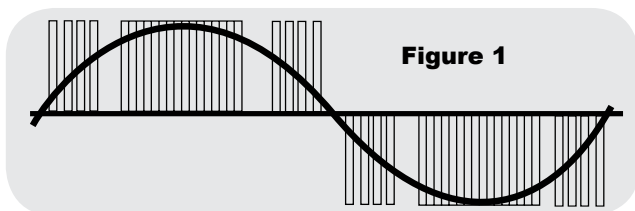
NOTE: Marathon inverter-duty motors have limitations as well. Please see the Marathon section for more details.

**Background:** For many years, AC motors were driven by across-the-line contactors and starters. The electricity sent to the motor was a very clean sine wave at 60Hz. Noise and voltage peaks were relatively small. However, there were drawbacks: they only ran electrically at one speed (speed reduction was usually handled by gearboxes or some other, usually inefficient, mechanical means) and they had an inrush of electrical current (when the motor was first turned on) that was usually 5 to 6 times the normal current that the motor would consume. The speed reduction apparatus was expensive and bulky, and the inrush would wreak havoc with power systems and loading (imagine an air conditioning system in an old house - when the compressor would kick on, the lights would dim; now imagine the same circumstances with a motor the size of a small car).

**Note:** The following discussion applies only to 3-phase motors.

### Enter the VFDs (variable frequency drives):

Drives were introduced to allow the speed of these motors to be changed while running and to lessen the inrush current when the drive first starts up. To do this, the drive takes the incoming 60Hz AC power and rectifies it to a DC voltage (every drive has a DC bus that is around 1.414 (sqrt of 2) \* incoming AC Line Voltage).

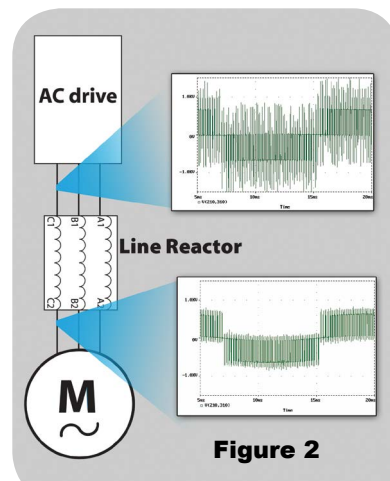


This DC voltage is then “chopped” by power transistors at very high frequencies to simulate a sine wave that is sent to the motor [see Figure 1]. By converting the incoming power to DC and then reconvert it to AC, the drive can vary its output voltage and output frequency, thus varying the speed of a motor. Everything sounds great, right? We get to control the frequency and voltage going out to the motor, thus controlling its speed.

**Some things to watch out for:** A VFD-driven general purpose motor can overheat if it is run too slowly. (Motors can get hot if they’re run slower than their rated speed.) Since most general purpose motors cool themselves with shaft-mounted fans, if the motor overheats, bearing and insulation life will be reduced. Therefore there are minimum speed requirements for all motors.

The voltage “chopping” that occurs in the drive actually sends high-voltage spikes (at the DC bus level) down the wire to the motor.

If the system contains long cabling, there are actually instances where a reflected wave occurs at the motor. The reflected wave can effectively double the voltage on the wire. This can lead to premature failure of the motor insulation. Long cable lengths between the motor and drive increase the harmful effects of the reflected wave, as do high chopping frequencies (listed in drive manuals as carrier frequencies). Line reactors, 1:1 transformers placed at the



output of the drive, can help reduce the voltage spikes going from the drive to the motor. Line reactors are used in many instances when the motor is located far from the drive [see Figure 2].

In summary, general purpose motors can be run with drives in many applications; however inverter-duty motors are designed to handle much lower speeds without overheating and they are capable of withstanding higher voltage spikes without their insulation failing. With the increased performance comes an increase in cost. This additional cost can be worth it if you need greater performance.

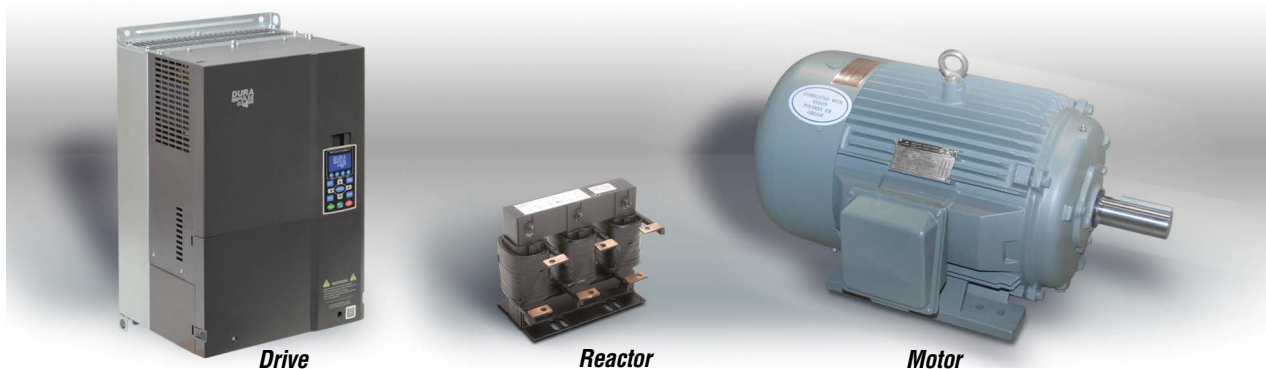
The considerations for applying IronHorse motors are given below.

Heat considerations		
	IronHorse speed ratio	For an 1800 RPM motor, minimum IronHorse speed is:
<b>Variable Torque applications (fans, centrifugal pumps, etc.)</b>	5:1 (EPAAct motors) 10:1 (PE motors)	1800/5 = 360RPM 1800/5 = 180RPM
<b>Constant Torque Applications (conveyors, extruders, etc.)</b>	2:1 (EPAAct motors) 4:1 (PE motors)	1800/2 = 900RPM 1800/4 = 450RPM
Voltage Spike considerations		
	Max cable distance from drive to IronHorse motor	Max cable distance with a 3% line reactor between drive and IronHorse motor
<b>For use with 230V and 460V VFDs*</b>	125 ft	250 ft

\* Up to 6kHz carrier frequency

# IronHorse® General-Purpose AC Motors

## Using IronHorse General-Purpose Motors with AC Drives



### AC drive motor control vs. across-the-line motor control

General purpose AC induction motors are typically controlled by across-the-line starters, i.e. contactors, manual motor starters, etc. However, three-phase general purpose motors can also be controlled by AC drives under certain conditions. (Single-phase AC motors cannot be controlled by typical three-phase AC drives.)

Across-the-line control applies full voltage to the motor at startup, and has several disadvantages.

- High inrush current - startup inrush current is typically 5-6 times the normal motor full load current, and can significantly increase utility bills.
- Inability to change speeds - the motor runs only at its rated speed.
- Inefficiency in some applications - fan and pump applications require ON/OFF control or valves/dampers to control flow.
- Contact maintenance - arcing caused by high inrush and breaking currents significantly reduce the motor starter's life span.

Many applications can use AC drive control for three-phase AC induction motors, which has several advantages:

- Lower inrush current at motor startup
- Ability to change motor speed
- Greater efficiency in some applications. - fan and pump applications can use the AC drive to provide both motor control and flow control. The drive can control the flow by varying the motor speed, and therefore eliminate the need for inefficient valves/dampers.
- Solid state power delivery; minimal maintenance.

**NOTE:** AC drive (VFD) control is applicable only for three-phase AC motors (three-phase AC drives cannot be used to control single-phase motors)

General purpose AC induction motors are not designed specifically for use with AC drives, so there are three major considerations for AC drive control of three-phase general purpose motors:

### 1. Heat considerations for AC drive control

Fan-cooled motors are designed to provide sufficient insulation cooling when the motors run at rated speed. The cooling ability of fans is reduced when motors run at lower speeds, and the insulation in general purpose motors is not designed for this condition. Therefore, there are limitations on how slowly general purpose motors can be continuously run without prematurely causing motor insulation failure.

#### • Constant Torque (CT) Applications

**PE motors: 4:1 (1/4 rated speed)**

**EPAct motors: 2:1 (1/2 rated speed)**

The CT minimum continuous speed for an IronHorse general purpose motor is either one quarter or one half of its rated speed, as shown in the motor Performance Data tables. (Constant torque loads require the same amount of torque from the motor regardless of speed; e.g., conveyors, cranes, machine tools.)

#### • Variable Torque (VT) Applications

**PE motors: 10:1 (1/10 rated speed)**

**EPAct motors: 5:1 (1/5 rated speed)**

The VT minimum continuous speed for an IronHorse general purpose motor is either one tenth or one fifth of its rated speed, as shown in the motor Performance Data tables. (Variable torque loads require less torque at lower speeds, resulting in less heat generated by the motor; e.g., fans, centrifugal pumps.)

If your application requires motors to run at speeds below those described above, use our Marathon inverter duty motors. Inverter duty motors can run fully loaded at very low speeds without being damaged by overheating.

### 2. Voltage spike considerations for AC drive control

All AC drives cause large voltage spikes between the drive and the motor, and long cable distances increase these spikes even more. Therefore, there are maximum cable lengths that can be run between the drive and the motor. Line (load) reactors can be installed near the drive output to reduce the voltage spikes.

- 230V and 460V **Without Reactor** – 125 ft maximum cable length between drive and motor
- 230V and 460V **With Reactor** – 250 ft maximum cable length between drive and motor

If your application requires cable lengths longer than those described above, please use our Marathon inverter-duty motors.

### 3. Carrier frequency limitation for AC drive control

The AC Drive carrier frequency should be set to 6kHz or less.

# AC Motor Selection – IronHorse® General Purpose Motors

IronHorse® General Purpose Motor Selection					
Characteristics	1-Phase		3-Phase		
	56C/56HC Frame Rolled Steel***	T Frame Farm Duty	56C/56HC Frame Rolled Steel***	56C Frame Stainless Steel	Cast Iron T & TC Frames
<b>Electrical Characteristics</b>					
<b>Horsepower range</b>	1/3 – 2	2 – 5	1/3 – 3	1/3 – 3/4	PE: 1–200(T); 1–100(TC) EPAct: 250–300(T)
<b>Base speed (# Poles)</b>	1800 (4), 3600 (2)	1800 (4)	1800 (4), 3600 (2)		1200(6), 1800 (4), 3600(2)
<b>Standard Voltage</b>	115/208-230, 115/230	230	208-230/460		208-230/460 (250 & 300 hp 460V only)
<b>Phase / Base Frequency (Hz)</b>	1 / 60		3 / 60		
<b>Service Factor</b>	1.15		1.15 (line) ; 1.0 (drive)		
<b>Design Code (NEMA)</b>	L, N	L	B		
<b>Insulation Class</b>	F				
<b>Insulation System</b>	dip & bake twice	VPI, then bake, then dip and bake	dip & bake	double dip & bake	EPAct: double dip & bake PE: VPI
<b>Duty Cycle</b>	continuous				
<b>Thermal protection</b>	none	yes	none		
<b>Mechanical Characteristics</b>					
<b>Frame size (mounting)</b>	56C or 56HC	182T – 184T	56C or 56HC		143T/TC – 405TC/449T
<b>Enclosure</b>	TEFC				
<b>Frame material</b>	rolled steel		304 stainless steel		cast iron
<b>End bracket material</b>	aluminum	cast iron	aluminum	304 stainless steel	cast iron
<b>Junction box material</b>	steel		304 stainless steel		cast iron
<b>Fan guard material</b>	steel	steel	steel	304 stainless steel	steel
<b>Fan material</b>	polypropylene plastic	plastic	plastic	heat-resistant polyethylene	plastic (143T/TC - 445/7T) aluminum (449T)
<b>Lead termination</b>	junction box				
<b>Standard mounting</b>	C-Face with Removable Rigid Base	Rigid Base	C-Face with Removable Rigid Base	C-Face with Rigid Base C-Face with Round Body	Rigid Base (C-Flange kit available EPAct) C-Face with Rigid Base (1-100 hp)
<b>Drive end shaft slinger</b>	yes				
<b>Paint</b>	black	green	black	n/a	EPAct: epoxy primer / synthetic alkyd enamel PE: polyurethane enamel
<b>Bearings</b>	ball				1-75 hp: ball 100-300 hp: roller
<b>Grease</b>	Mobil Polyrex EM		Korschun lithium-based		Mobil Polyrex EM
<b>Standard junction box assembly position</b>	F1				F1 (some sizes reversible to F2)
<b>Performance Characteristics</b>					
<b>Constant Torque speed range</b>	n/a	n/a	2:1 (MTR, MTSS); 4:1 (MTRP, MTR2)		2:1 (EPAct) 4:1 (Premium Efficiency)
<b>Variable Torque speed range</b>	n/a	n/a	5:1 (MTR, MTSS); 10:1 (MTRP, MTR2)		5:1 (EPAct) 10:1 (Premium Efficiency)
<b>Constant Horsepower speed range</b>	n/a	n/a	1.5:1		1.5:1
<b>Temperature rise</b>	F	B			
<b>Encoder provisions</b>	none				
<b>Other Characteristics</b>					
<b>Warranty*</b>	2 years		1 year		2 years
<b>Agency Approvals **</b>	CE, cCSA <sub>US</sub>		cCSA <sub>US</sub>		CE, cCSA <sub>US</sub>
* See Terms and Conditions for motor warranty explanation.					
1) For warranty on IronHorse motors below 50 hp, warranty service can be arranged through AutomationDirect.					
2) For warranty on IronHorse motors 50 hp and above, motors must be inspected by a local EASA motor repair or service center; (see AutomationDirect Terms & Conditions).					
** To obtain the most current agency approval information, see the Agency Approval Checklist on the specific part number's web page.					
*** 56HC motors are capable of 56C C-face mounting, and are also compatible with 56, 143T, and 145T foot mounting dimensions.					

# IronHorse® General-Purpose AC Motors MTF, MTR, MTR2, MTC, MTCP, & MTSS

## Model Overview

IronHorse motors are manufactured by leading motor suppliers with over 20 years experience delivering high-quality motors to the demanding U.S. market. Our suppliers produce motors in ISO9001 facilities, and test the motors during production and after final assembly. This is how we can stand behind our IronHorse motors with a two-year warranty (one year for Stainless Steel).

The IronHorse line of motors includes:

- **MTR & MTR2 Series:** TEFC 56(H)C-frame **single-phase** AC motors with rolled-steel frames; flange mount and removable mounting feet; 0.33–2 hp
- **MTF Series:** TEFC T-frame **single-phase** Farm-Duty AC motors with rolled-steel frames and mounting feet; 2–5 hp
- **MTR Series:** TEFC 56C-frame **three-phase** AC motors with rolled-steel frames; flange mount and removable mounting feet; 0.33–2 hp
- **MTSS Series:** TEFC 56C-frame **three-phase** AC motors with stainless-steel frames; flange mount and round bodies or rigid mounting feet; 0.33–0.75 hp
- **MTCP Series:** TEFC T-frame **three-phase** Premium Efficiency AC motors with cast-iron frames and mounting feet; 1–200 hp (C-face 1–100 hp)
- **MTC Series:** TEFC T-frame **three-phase** EPAct AC motors with cast-iron frames and mounting feet; 250–300 hp
- Replacement switches, junction boxes, and start and run capacitors available for IronHorse single-phase motors
- Replacement bases, fans, and fan shrouds available for many IronHorse motors
- Accessory C-flange kits available for flange mounting of IronHorse three-phase cast iron T-frame Premium Efficiency motors
- STABLE motor slide bases for adjustable mounting of NEMA motors from 56 to 449T (adjustable stainless steel bases not available)



**Single-Phase  
Farm Duty T-Frame**



**Single-Phase  
Rolled Steel 56C Frame**



**Three-Phase  
Stainless Steel 56C – Round Body**



**Three-Phase Premium Efficiency  
Cast Iron T-Frame**



**Three-Phase  
Rolled Steel 56C Frame**



**Three-Phase  
Stainless Steel 56C – Rigid Base**



**Three-Phase Premium Efficiency  
Cast Iron TC Frame**

# IronHorse<sup>®</sup> Rolled-Steel AC Motors – 1-Phase

## 56C/56HC Frame TEFC Motors – Single-Phase 0.33 to 2 hp

### Features

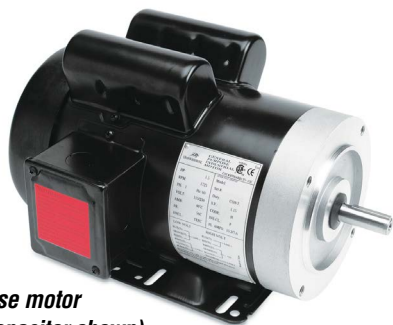
- Totally Enclosed Fan Cooled (TEFC) enclosure
- IP43 environmental rating
- NEMA 56C or 56HC flange mount (varies by model)
- Rolled steel shell frame / cast aluminum end bell
- Removable base / bolt-on/bolt-off mounting feet
- No mounting orientation restrictions
- Steel fan cover
- Large all-metal capacitor cover with rubber gasket and oversized capacitors
- Large easy-to-wire junction box with rubber gasket
- Heavy duty oversized ball bearings
- High tensile strength steel shaft
- Large Mylar nameplate with easy-to-read wiring diagram
- Electrically reversible
- NEMA design L or N (varies by model)
- Class F winding insulation
- Service Factor: 1.15
- Two year warranty
- cCSA<sub>US</sub> certified, CE

### Accessories Available

- Start capacitors (replacement/spare)
- Run capacitors (replacement/spare)
- Centrifugal switches (replacement/spare)
- Stationary switches (replacement/spare)
- Junction boxes (replacement/spare)
- Fans (replacement/spare)
- Fan shrouds (replacement/spare)
- Motor bases (replacement/spare)

### Applications

- Conveyors
- Fans
- Gear reducers
- Pumps



**MTR Series 1-phase motor**  
(model with run capacitor shown)



**MTR2 Series 1-phase motor**  
(model without run capacitor shown)

Motor Specifications – Single-Phase 56C/56HC Frame Motors														
Part Number	Price	HP		Base RPM		1-phase Voltage		Housing	NEMA Frame	Service Factor		F.L. Amps		Approx Weight (lb)
		60 Hz	50 Hz	60 Hz	50 Hz	60Hz	50Hz			60Hz	50Hz	115V/230V 60Hz	110/220V 50Hz	
<b>MTR2-P33-1AB18</b>	\$101.00	1/3	1/4	1800	1500	115/230	110/220	TEFC	56C flange mount	1.15	1	5.2 / 2.6	5.4 / 2.7	22
<b>MTR2-P50-1AB18</b>	\$105.00	1/2	1/3									7.2 / 3.6	7.2 / 3.6	25
<b>MTR2-P75-1AB18</b>	\$116.00	3/4	1/2									10.0 / 5.0	9.6 / 4.8	29
<b>MTR2-001-1AB18</b>	\$129.00	1	3/4									13.0 / 6.5	12.4 / 6.2	36
<b>MTR2-1P5-1AB18</b>	\$165.00	1-1/2	1									14.5 / 7.3	14.0 / 7.0	37
<b>MTR2-002-1AB18</b>	\$198.00	2	1-1/2									19.6 / 9.8	23.4 / 11.7	44
<b>MTR-P33-1AB18</b>	\$101.00	1/3	-	-	-	115/208-230	-	F1 conduit box location	56C flange mount	-	-	6.6 / 3.3	-	26
<b>MTR-P50-1AB18</b>	\$105.00	1/2										8.8 / 4.4		28
<b>MTR-P75-1AB18</b>	\$116.00	3/4										11.0 / 5.5		32
<b>MTR-001-1AB18</b>	\$129.00	1										13.6 / 6.8		38
<b>MTR-1P5-1AB18</b>	\$159.00	1-1/2										15.2 / 7.6		45
<b>MTR2-P33-1AB36</b>	\$119.00	1/3										1/4		3600
<b>MTR2-P50-1AB36</b>	\$125.00	1/2	1/3	6.5 / 3.3	6.4 / 3.2	23								
<b>MTR2-P75-1AB36</b>	\$139.00	3/4	1/2	9.2 / 4.6	9.2 / 4.6	27								
<b>MTR2-001-1AB36</b>	\$146.00	1	3/4	11.5 / 5.8	10.2 / 5.1	30								
<b>MTR2-1P5-1AB36</b>	\$159.00	1-1/2	1	13.0 / 6.5	11.4 / 5.7	31								
<b>MTR2-002-1AB36</b>	\$187.00	2	1-1/2	17.0 / 8.5	14.6 / 7.3	37								
<b>MTR-1P5-1AB36</b>	\$152.00	1-1/2	-	-	115/208-230	-	-	F1 conduit box location	56C	-	-	14.2 / 7.1	-	37

Note: Please review the AutomationDirect Terms & Conditions for warranty and service on this product.

# IronHorse® Farm-Duty AC Motors – 1-Phase

## T-Frame TEFC Motors – Single-Phase 2 to 5 hp

### Features

- 230VAC 1-phase
- Totally Enclosed Fan Cooled (TEFC) enclosure
- IP55 environmental rating
- NEMA T-frame
- Rolled-steel housing
- Rigid mounting base
- Can be mounted in horizontal orientation
- Steel fan cover
- Class-10 manual-reset locked-rotor thermal protector (motor thermal overload must be provided separately)
- Large easy-to-wire junction box with rubber gasket
- Heavy duty oversized ball bearings
- High tensile strength steel shaft
- Mylar nameplate with easy-to-read wiring diagram
- Electrically reversible
- NEMA design L
- Class F winding insulation
- VPI (Vacuum and Pressure Impregnation) insulation process
- Service Factor: 1.15 @ 230VAC; 1.0 @ 208VAC
- Two year warranty
- cCSA<sub>US</sub> certified, CE

### Accessories Available

- Start capacitors (replacement/spare)
- Run capacitors (replacement/spare)
- Centrifugal switches (replacement/spare)
- Locked rotor thermal overload switches (replacement/spare)
- Junction boxes (replacement/spare)
- Fans (replacement/spare)
- Fan shrouds (replacement/spare)

### Applications

- Conveyors
- Fans
- Pumps
- Air compressors
- Other farm equipment



**MTF Series  
1-Phase Farm-Duty Motor**

Motor Specifications – Single-Phase Farm-Duty Motors									
Part Number	Price	HP	Base RPM	Voltage	Housing	NEMA Frame	Service Factor	F.L. Amps @ 230VAC	Approx Weight (lb)
<b>MTF-002-1C18-182</b>	\$309.00	2	1800	230VAC ±10%	TEFC	182T	1.15 @ 230VAC 1.0 @ 208VAC	8.5	74
<b>MTF-003-1C18</b>	\$365.00	3				184T		12.9	85
<b>MTF-005-1C18</b>	\$449.00	5				184T		21.2	105

**Notes:**  
 1) Please review the AutomationDirect Terms & Conditions for warranty and service on this product.  
 2) Certain heavy and oversized items can be shipped only via LTL. Check our web site for current shipping method constraints by part number.  
 3) Operate on 230VAC +/- 10% (1.15 @ 230VAC; 1.0 S.F. @ 208V), single-phase power only.

Performance Data – Single-Phase Farm-Duty Motors												
Part Number	HP	NEMA Design	FL RPM	Current @ 230V (Amps)			Torque (lb-ft)			FL Efficiency (%)	FL Power Factor	Rotor Inertia (lb-ft <sup>2</sup> )
				230V No Load	Full Load	Locked Rotor	Full Load	Locked Rotor	Break-down			
<b>MTF-002-1C18-182</b>	2	L	1725	2.7	8.5	70.0	6.04	20.54	15.10	82.5	0.92	0.35
<b>MTF-003-1C18</b>	3			3.9	12.9	95.0	9.11	32.80	23.69	81.5	0.93	0.60
<b>MTF-005-1C18</b>	5			6.6	21.2	160.0	15.30	58.14	36.72	81.0	0.90	0.81

# IronHorse® Rolled-Steel AC Motors – 3-Phase

## 56C/56HC-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp

### Features

- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA 56C or 56HC flange mount (56HC are suitable for 56, 143T, or 145T frame mounting dimensions)
- Rolled steel shell frame / cast aluminum end bell
- Removable base / bolt-on/bolt-off mounting feet
- Steel fan cover
- Large easy-to-wire junction box with rubber gasket
- Heavy duty oversized ball bearings
- High tensile strength steel shaft
- Electrically reversible
- Inverter capable (3-phase only)
- NEMA design B
- Class F winding insulation
- Service Factor: 1.15 across-the-line (1.0 for 3-phase with AC drive)
- Two year warranty
- CSA<sub>US</sub> certified, CE

### Accessories Available

- Junction boxes (replacement/spare)
- Fans (replacement/spare)
- Fan shrouds (replacement/spare)
- Motor bases (replacement/spare)
- Adjustable mounting slide bases

### Applications

- Conveyors
- Fans
- Gear reducers
- Pumps



*MTR Series 3-phase motor*



*MTRP Series 3-phase motor*



*MTR2 Series 3-phase motor*



# IronHorse<sup>®</sup> Rolled-Steel AC Motors – 3-Phase

## 56C/56HC-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp

Motor Specifications – Three-Phase 56C/56HC-Frame Motors – 1800 & 3600 RPM										
Part Number	Price	HP	Base RPM	Phase	Voltage	Housing	NEMA Frame	Service Factor	F.L. Amps @ 230V/460V	Approx Weight (lb)
<b>MTR2-P33-3BD18</b>	\$102.00	1/3	1800	3	230/460	TEFC rolled steel frame with cast aluminum end bell F1 conduit box location	56C flange mount (MTRP = 56HC)*	1.15	1.4 / 0.7	18
<b>MTR2-P33-3BD36</b>	\$83.00		3600						1.3 / 0.65	18
<b>MTR2-P50-3BD18</b>	\$108.00	1/2	1800						1.9 / 0.95	19
<b>MTR2-P50-3BD36</b>	\$91.00		3600						1.7 / 0.85	19
<b>MTR2-P75-3BD18</b>	\$117.00	3/4	1800						2.6 / 1.3	22
<b>MTR2-P75-3BD36</b>	\$99.00		3600						2.4 / 1.2	21
<b>MTR-P33-3BD18</b>	\$97.00	1/3	1800		208-230/460				1.6 / 0.8	23
<b>MTR-P33-3BD36</b>	\$79.00		3600						1.6 / 0.8	23
<b>MTR-P50-3BD18</b>	\$100.00	1/2	1800						2.0 / 1.0	24
<b>MTR-P50-3BD36</b>	\$87.00		3600						2.2 / 1.1	24
<b>MTR-P75-3BD18</b>	\$112.00	3/4	1800						2.8 / 1.4	26
<b>MTR-P75-3BD36</b>	\$95.00		3600						2.9 / 1.45	26
<b>MTR-001-3BD18</b>	\$125.00	1	1800	3.6 / 1.8	29					
<b>MTR-001-3BD36</b>	\$101.00		3600	3.6 / 1.8	28					
<b>MTRP-001-3BD18</b>	\$153.00		1800	3.2 / 1.6	35					
<b>MTRP-001-3BD36</b>	\$125.00		3600	3.0 / 1.50	23					
<b>MTR-1P5-3BD18</b>	\$145.00	1-1/2	1800	4.8 / 2.4	33					
<b>MTR-1P5-3BD36</b>	\$114.00		3600	4.6 / 2.3	34					
<b>MTRP-1P5-3BD18</b>	\$175.00		1800	4.5 / 2.25	43					
<b>MTRP-1P5-3BD36</b>	\$142.00		3600	4.0 / 2.0	31					
<b>MTR-002-3BD18</b>	\$166.00	2	1800	6.0 / 3.0	42					
<b>MTR-002-3BD36</b>	\$127.00		3600	6.0 / 3.0	43					
<b>MTRP-002-3BD18</b>	\$204.00		1800	6.0 / 3.0	49					
<b>MTRP-002-3BD36</b>	\$152.00		3600	5.2 / 2.6	33					
<b>MTRP-003-3BD36</b>	\$197.00	3	3600	7.4 / 3.7	39					

**Note:** Please review the AutomationDirect Terms & Conditions for warranty and service on this product.  
 IronHorse Motors with product numbers ending in P are Premium Efficiency motors and meet or exceed all current efficiency guidelines.  
 \*56HC motors are capable of 56C C-face mounting, and are also compatible with 56, 143T, and 145T foot mounting dimensions.

# IronHorse® MTSS Stainless-Steel Three-Phase General-Purpose AC Motors

MTSS Stainless Steel TEFC Motors – Three Phase – 0.33 to 0.75 hp



**MTSS-xxx-3BDxxR**  
**3-Phase Stainless Steel 56C Frame without Feet**

## Features

- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA 56C flange mount
- 304 stainless steel shell frame
- Stainless steel shaft
- Large easy-to-wire junction box with fluorinated silicone rubber gasket
- Nickel-plated brass cable gland included
- IP56 environmental rating
- Available with or without mounting feet
- Heavy-duty permanently-sealed oversized ball bearings
- Nameplate information with wiring diagram etched into frame
- Electrically reversible
- NEMA design B
- Class F winding insulation
- Service Factor: 1.15 across-the-line (1.0 with AC drive)
- One year warranty
- cCSA<sub>US</sub> certified

## Accessories & Spare Parts Available

- Nickel-plated brass cable gland (spare/replacement)



**MTSS-xxx-3BDxx**  
**3-Phase Stainless Steel 56C Frame with Feet**

## Applications

- Conveyors
- Fans
- Gear reducers
- Pumps
- Inverter capable
- Washdown environments



**MTAS-CG-M22**  
**Spare/Replacement Nickel-plated Brass Cable Gland**

# IronHorse<sup>®</sup> MTSS Stainless-Steel Three-Phase General-Purpose AC Motors

56C Frame Stainless Steel TEFC Motors – Three Phase – 0.33 to 0.75 hp

Motor Specifications – 3-phase 56C Frame Stainless Steel Motors – 1800 & 3600 RPM										
Part Number	Price	HP	Base RPM	Phase	Voltage	Housing	NEMA Frame	Service Factor	F.L. Amps @ 208-230V/460V	Approx Weight (lb)
MTSS-P33-3BD18R	\$275.00	1/3	1800	3	208-230/460	TEFC	56C flange mount	1.15	1.5-1.4 / 0.7	27
MTSS-P50-3BD18R	\$279.00	1/2				stainless steel frame with round body			1.55-1.5 / 0.75	27
MTSS-P75-3BD18R	\$288.00	3/4	F1 conduit box location			2.6-2.4 / 1.2			29	
MTSS-P33-3BD18	\$289.00	1/3	1800			TEFC			1.5-1.4 / 0.7	28
MTSS-P50-3BD18	\$294.00	1/2	1800			stainless steel frame with rigid base			1.55-1.5 / 0.75	28
MTSS-P50-3BD36	\$287.00		3600			1.99-1.8 / 0.9			29	
MTSS-P75-3BD18	\$303.00	3/4	1800			F1 conduit box location			2.6-2.4 / 1.2	30
MTSS-P75-3BD36	\$292.00		3600						2.4-2.3 / 1.15	31

*Note: Please review the AutomationDirect Terms & Conditions for warranty and service on this product.*

Motor Accessory (Optional) – 3-phase 56C Frame Stainless Steel Motors – 1800 & 3600 RPM			
Part Number	Price	Description	Approx Weight (lb)
MTAS-CG-M22	\$27.00	Cable gland; M22 x 1.5 mm thread; (1) silicone rubber gasket accommodates a cable diameter range of 0.393 to 0.512 in (10 to 13 mm); IP66 protection level; nickel-plated brass housing. This is a SPARE part for IronHorse MTSS motors - one cable gland is pre-installed on each MTSS motor.	0.2

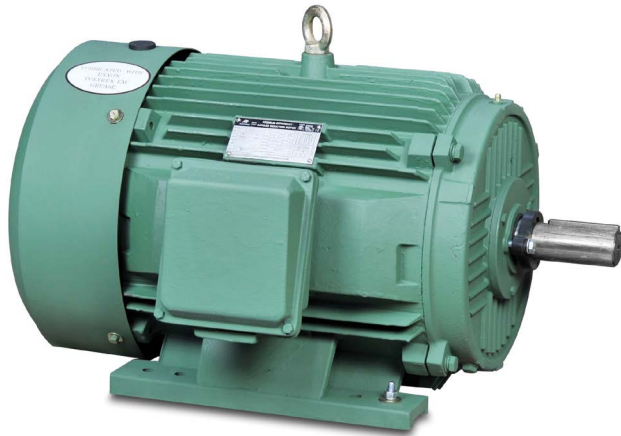
Performance Data – 3-phase 56C Frame Stainless Steel Motors (460V data except as indicated) – 1800 & 3600 RPM															
Part Number	HP	NEMA Design	FL RPM	Minimum Speed (rpm)		Current @ 460V (Amps)		Torque (lb-ft)			Maximum Speed (rpm)		FL Efficiency (%)	FL Power Factor	Rotor Inertia (lb-ft <sup>2</sup> )
				CT (2:1)	VT (5:1)	No Load	Locked Rotor	Full Load	Locked Rotor	Break-down	CHP*	Safe			
MTSS-P33-3BD18(R)	1/3	B	1725	900	360	0.29	4.2	1.0	2.9	3.9	2250	4500	82.5	0.71	0.078
MTSS-P50-3BD18(R)	1/2		1725	900	360	0.30	4.6	1.5	3.8	5.2	2250		82.5	0.76	0.078
MTSS-P50-3BD36			3460	1800	720	0.36	6.0	0.7	1.9	2.5	4500		77.0	0.88	0.077
MTSS-P75-3BD18(R)	3/4		1725	900	360	0.44	7.3	2.2	5.0	7.0	2250		82.5	0.78	0.081
MTSS-P75-3BD36			3470	1800	720	0.43	7.6	1.1	2.7	3.3	4500		73.0	0.84	0.100

\* Maximum Coupled HP speed is for direct-coupled loads.

# IronHorse® MTC & MTCP Premium-Efficiency Cast-Iron Three-Phase AC Motors

T-Frame TEFC Motors – Three-Phase Industrial Duty – 1 to 200 hp<sup>(4)</sup>

TC-Frame (C-Face) TEFC Motors – Three-Phase Industrial Duty – 1 to 100 hp



**Premium Efficiency  
Three-Phase Cast Iron T-Frame**



**Premium Efficiency  
Three-Phase Cast Iron TC-Frame**

## Features

- Available in 1200, 1800, & 3600 rpm
- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA TC-frame (C-face) and T-frame motors
- Cast iron frame with ribbed design for maximum cooling
- Solid full frame length cast iron mounting feet
- Steel fan cover
- Cast iron junction box with rubber gasket and rubber dust cover
- NSK/NTN/SKF brand premium quality ball or roller bearings
- Maintenance free bearings (10 hp and below)
- V-ring shaft seals on drive end and on opposite drive end
- Electrically reversible
- Class F winding insulation
- Service Factor: 1.15 (1.0 with AC drive)
- Meets or exceeds Premium Efficiency standards
- Class I, Div 2 hazardous locations
- Inverter ratings: 10:1 (variable torque); 4:1 (constant torque)
- Two year warranty
- cCSA<sub>us</sub> certified, ISO9001, CE

## Accessories & Spare Parts Available

- STABLE motor slide bases for adjustable mounting
- C-flange kits (for converting T-frame motors to TC-frame)
- Replacement junction boxes
- Replacement fans
- Replacement fan shrouds

## Applications

- Fans
- Conveyors
- Pumps
- Material Handling
- Metal Processing
- Textile Processing
- Test Stands

# IronHorse<sup>®</sup> MTC & MTCP Premium-Efficiency Cast-Iron Three-Phase AC Motors

T-Frame TEFC Motors – Three-Phase Industrial Duty – 1–200 hp – 1800 rpm

TC-Frame (C-Face) TEFC Motors – 3-Phase Industrial Duty – 1–100 hp – 1800 rpm

Motor Specifications – Premium-Efficiency T & TC Frame Three-Phase Motors – 1800 rpm													
Part Number <sup>(1)</sup>	Price	HP <sup>(2)</sup>	Base RPM	Phase	Voltage	Housing	NEMA Frame	Mounting <sup>(3)</sup>	Holes / Foot	Service Factor	F.L. Amps @230V/460V	Approx Product Weight (lb) <sup>(4)</sup>	
MTCP-001-3BD18	\$162.00	1	1800	3	208-230/460	TEFC	143T	F1(F2)	2	1.15	3.22 / 1.61	41	
MTCP-001-3BD18C	\$182.00						143TC					45	
MTCP-1P5-3BD18	\$202.00	1.5					145T				4	4.64 / 2.32	47
MTCP-1P5-3BD18C	\$222.00						145TC					50	
MTCP-002-3BD18	\$228.00	2					145T				4	6.00 / 3.00	56
MTCP-002-3BD18C	\$242.00						145TC					60	
MTCP-003-3BD18	\$365.00	3					182T				2	8.05 / 4.02	84
MTCP-003-3BD18C	\$419.00						182TC					92	
MTCP-005-3BD18	\$379.00	5					184T				4	13.4 / 6.71	99
MTCP-005-3BD18C	\$433.00						184TC					107	
MTCP-7P5-3BD18	\$583.00	7.5					213T				2	18.7 / 9.34	150
MTCP-7P5-3BD18C	\$647.00						213TC					154	
MTCP-010-3BD18	\$659.00	10					215T				4	24.9 / 12.5	186
MTCP-010-3BD18C	\$734.00						215TC					190	
MTCP-015-3BD18	\$893.00	15					254T				2	35.8 / 17.9	329
MTCP-015-3BD18C	\$987.00						254TC					325	
MTCP-020-3BD18	\$1,034.00	20					256T				4	47.9 / 24.0	390
MTCP-020-3BD18C	\$1,147.00						256TC					370	
MTCP-025-3BD18	\$1,337.00	25					284T				2	59.6 / 29.8	455
MTCP-025-3BD18C	\$1,352.00						284TC					467	
MTCP-030-3BD18	\$1,436.00	30	286T	4	70.0 / 35.0	488							
MTCP-030-3BD18C	\$1,434.00		286TC		497								
MTCP-040-3BD18	\$1,722.00	40	324T	2	94.8 / 47.4	611							
MTCP-040-3BD18C	\$1,770.00		324TC		626								
MTCP-050-3BD18	\$1,928.00	50	326T	4	117 / 58.4	690							
MTCP-050-3BD18C	\$1,969.00		326TC		706								
MTCP-060-3BD18	\$2,569.00	60	364T	2	139 / 69.6	851							
MTCP-060-3BD18C	\$2,564.00		364TC		864								
MTCP-075-3BD18	\$2,769.00	75	365T	4	173 / 86.7	948							
MTCP-075-3BD18C	\$2,770.00		365TC		961								
MTCP-100-3BD18	\$3,499.00	100	405T	4	229 / 114	1199							
MTCP-100-3BD18C	\$3,433.00		405TC		1236								
MTCP-125-3BD18	\$4,269.00	125	444T	2	285 / 143	1500							
MTCP-150-3BD18	\$4,269.00	150	445T	4	342 / 171	1630							
MTCP-200-3BD18	\$6,189.00	200	445/7T	4	453 / 227	2127							
MTC-250-3D18	\$7,389.00	250	1800	3	460	TEFC	449T	F1	2	1.15	- / 282	2508	
MTC-300-3D18	\$9,579.00	300					449T				- / 334	2728	

1) Please review the AutomationDirect Terms & Conditions for warranty and service on this product.  
 2) For warranty on motors 50 hp and above, motors must be inspected by an EASA motor repair or service center. Premium Efficiency standards not applicable for MTC motors over 200 hp.  
 3) F1(F2) indicates F1 conduit box mounting location, field convertible to F2 (as shown on dimensional diagram).  
 4) Certain heavy and oversized items can be shipped only via LTL. Check our web site for current shipping method constraints by part number.

# IronHorse® MTC & MTCP Premium-Efficiency Cast-Iron Three-Phase AC Motors

T-Frame TEFC Motors – Three-Phase Industrial Duty – 1–20 hp – 1200 & 3600 rpm

Motor Specifications – Premium-Efficiency T-Frame Three-Phase Motors – 1200 rpm												
Part Number <sup>(1)</sup>	Price	HP	Base RPM	Phase	Voltage	Housing	NEMA Frame	Mounting <sup>(2)</sup>	Holes / Foot	Service Factor	F.L. Amps @230V/460V	Approx Product Weight (lb) <sup>(3)</sup>
MTCP-001-3BD12	\$217.00	1	1200	3	208-230/460	TEFC cast iron	145T	F1(F2)	4	1.15	3.2 / 1.6	60
MTCP-1P5-3BD12	\$321.00	1.5					182T		2		4.5 / 2.2	104
MTCP-002-3BD12	\$355.00	2					184T		4		5.7 / 2.9	110
MTCP-003-3BD12	\$449.00	3					213T		2		8.5 / 4.2	160
MTCP-005-3BD12	\$539.00	5					215T		4		13.8 / 6.9	180
MTCP-7P5-3BD12	\$834.00	7.5					254T		2		20.9 / 10.4	325
MTCP-010-3BD12	\$917.00	10					256T		4		27.8 / 13.9	325
MTCP-015-3BD12	\$1,249.00	15					284T		2		40.3 / 20.2	420
MTCP-020-3BD12	\$1,348.00	20					286T		4		52.4 / 26.2	470

1) Please review the AutomationDirect Terms & Conditions for warranty and service on this product.  
 2) F1(F2) indicates F1 conduit box mounting location, field convertible to F2 (as shown on dimensional diagram).  
 3) Certain heavy and oversized items can be shipped only via LTL. Check our web site for current shipping method constraints by part number.

Motor Specifications – Premium-Efficiency T-Frame Three-Phase Motors – 3600 rpm												
Part Number <sup>(1)</sup>	Price	HP	Base RPM	Phase	Voltage	Housing	NEMA Frame	Mounting <sup>(2)</sup>	Holes / Foot	Service Factor	F.L. Amps @230V/460V	Approx Product Weight (lb) <sup>(3)</sup>
MTCP-1P5-3BD36	\$183.00	1.5	3600	3	208-230/460	TEFC cast iron	143T	F1(F2)	2	1.15	4.08 / 2.04	44
MTCP-002-3BD36	\$197.00	2					145T		4		5.4 / 2.7	53
MTCP-003-3BD36	\$278.00	3					182T		2		7.74 / 3.87	79
MTCP-005-3BD36	\$322.00	5					184T		4		12.6 / 6.3	92
MTCP-7P5-3BD36	\$488.00	7.5					213T		2		18.46 / 9.23	140
MTCP-010-3BD36	\$513.00	10					215T		4		24.4 / 12.2	161
MTCP-015-3BD36	\$889.00	15					254T		2		35.0 / 17.5	278
MTCP-020-3BD36	\$1,019.00	20					256T		4		46.4 / 23.2	306

1) Please review the AutomationDirect Terms & Conditions for warranty and service on this product.  
 2) F1(F2) indicates F1 conduit box mounting location, field convertible to F2 (as shown on dimensional diagram).  
 3) Certain heavy and oversized items can be shipped only via LTL. Check our web site for current shipping method constraints by part number.