IronHorse™ General Purpose AC Motors Model Overview

Single-phase Rolled Steel 56C Frame

Three-phase Rolled Steel 56C Frame

Three-phase Cast Iron T Frame

Three-phase Cast Iron TC Frame

IronHorse motors are manufactured by a leading motor supplier with over 20 years experience delivering high-quality motors to the demanding U.S. market. Our supplier produces motors in an ISO9001 facility which tests the motors during production and after final assembly. This is how we can stand behind our IronHorse motors with a **two-year warranty**.

The IronHorse line of motors includes:

- TEFC 56C-frame single-phase AC motors with rolled steel frames; flange mount and removable mounting bases; 0.33–1.5hp
- TEFC 56C-frame three-phase AC motors with rolled steel frames; flange mount and removable mounting bases; 0.33–2hp
- TEFC T-frame three-phase AC motors with cast iron frames and mounting feet; 1–300hp
- TEFC TC-frame three-phase C-face AC motors with cast iron frames and mounting feet; 1–100hp
- Replacement start and run capacitors available for IronHorse single-phase motors
- Accessory C-flange kits available for flange mounting of IronHorse three-phase cast iron T-frame motors
- STABLE motor slide bases for adjustable mounting of NEMA motors from 56 - 449T

IronHorse™ Part Number Explanation

MT C - 7P5 - 3 BD 18 CK

Optional Identifier
CK: C-face cast iron motor

Nominal RPM
12: 1200 rpm
18: 1800 rpm
36: 3600 rpm

Voltage Class (multiple letters possible)
A: 115 VAC
B: 208-230 VAC
D: 460 VAC

Phase
1: Single phase
3: Three phase

Rated Horsepower
P: Decimal point
left of P: Rated full hp
right of P: Rated fractional hp

Motor type
A: Motor accessory
C: Motor with cast iron frame
R: Motor with rolled steel frame

IronHorse Motors Series Designation

56C Frame TEFC Motors – Single-Phase 0.33–1.5 hp and Three-Phase 0.33–2 hp

Three-Phase

Single-Phase

Features

- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA 56C flange mount
- Rolled steel shell frame / cast aluminum end bell
- Removable base / bolt-on/bolt-off mounting feet
- Steel fan cover
- Large all-metal capacitor cover with rubber gasket and oversized capacitors (single phase motors only)
- Large easy-to-wire junction box with rubber gasket
- Heavy duty oversized ball bearings
- High tensile strength steel shaft
- Large all-metal nameplate with easy to read wiring diagram
- Electrically reversible
- 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
- $_{c}CSA_{us}$ certified, CE

Applications

- Conveyors
- Fans
- Gear Reducers
- Pumps
- Inverter capable (3-phase only)

IronHorse™ Cast Iron AC Motors

T-Frame TEFC Motors – Three-phase Industrial Duty – 1 to 300 hp
TC-Frame (C-face) TEFC Motors – Three-phase Industrial Duty – 1 to 100 hp

Three-phase
Cast Iron T-Frame

Three-phase
Cast Iron TC-Frame

Features

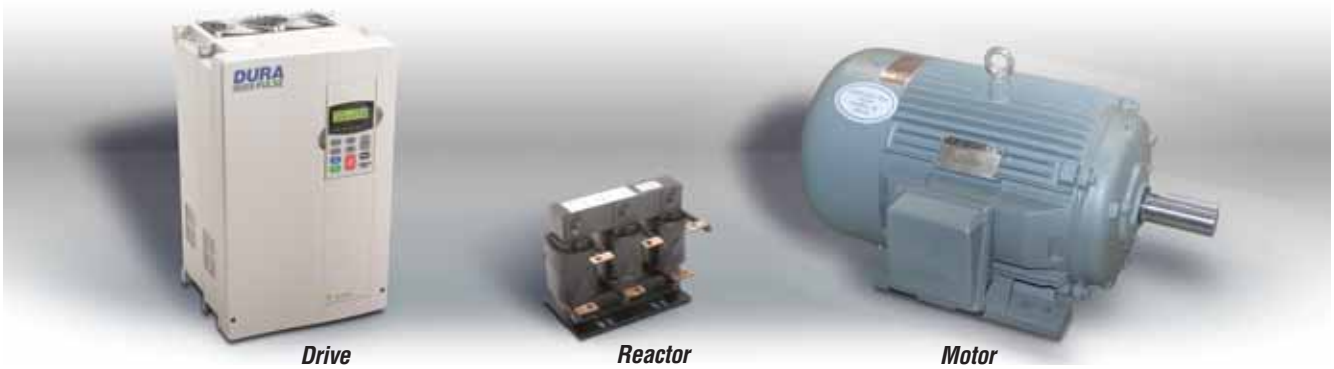
- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA TC-frame (C-face) and T-frame motors
- C-flange kits available for T-frame motors
- Cast iron frame with ribbed design for maximum cooling
- Solid full frame length cast iron mounting feet
- Steel fan cover
- Cast iron junction box with rubber gasket and rubber dust cover
- NSK/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)
- High efficiency $_{c}CSA_{us}$ certified, ISO9001, CE, EPACT certified
- Inverter ratings: 5:1 (variable torque); 2:1 (constant torque)
- Two year warranty

Applications

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

IronHorse™ General Purpose AC Motors

Using IronHorse™ General Purpose Motors with AC Drives



Drive *Reactor* *Motor*

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:

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 – 2:1 (1/2 rated speed)** – The CT minimum continuous speed for an IronHorse general purpose motor is 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 – 5:1 (1/5 rated speed)** – The VT minimum continuous speed for an IronHorse general purpose motor is 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.

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.

Carrier Frequency Limitation for AC Drive Control

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

Motor Selection – Three-phase Motors

(Single-phase motors are shown on page 15–10)

3-Phase Characteristic	IronHorse™ 56C Frame 3-Phase	IronHorse™ T & TC Frames	Marathon microMAX™	Marathon Black Max®	Marathon Blue Max®	Marathon NEMA Premium® XRI®	Marathon Blue Chip XRI®
Electrical Characteristics							
Horsepower range	1/3 - 2	1 - 300 (T); 1 - 100 (TC)	1/4 - 10	1/4 - 30	40 - 100	1 - 10	15 - 100
Base speed (# Poles)	1800 (4), 3600 (2)	1200(6), 1800 (4), 3600(2)	1800 (4)	1800 (4) and 1200 (6)	1800 (4)	1200(6),1800(4),3600(2)	1800 (4)
Standard Voltage	208-230/460	208-230/460 (250 & 300 hp 460V only)	230/460 (1/4 hp is 230V only)	230/460 and 575	230/460	208-230/460	230/460 and 575
Insulation Class	F	F	H	F	H	F	F
Insulation System	dip & bake	double dip & bake	CR^{200} magnet wire	MAX GUARD®		CR^{200} magnet wire	
Service Factor	1.15 (line) 1.0 (drive)	1.15 (line) 1.0 (drive)	1.0	1.0	1.0	1.15 (line) 1.0 (drive)	1.15
Phase/Base Frequency	3/60						
Design Code (NEMA)	B	A: 10-50 hp 4&6 pole B: all other sizes	A and B for 1/4 - 2 hp	A	A	B	B
Duty Cycle	Continuous						
Thermal protection	None			Class F thermostats		None	
Mechanical Characteristics							
Frame size (mounting)	56C	143T/TC - 405TC/449T	56C - 215TC	56C - 286TC	324T(C)–405T(C)	56C - 215TC	254T - 405T
Enclosure	TEFC	TEFC	TENV and TEFC	TENV	TEFC and TEBC	TEFC	TEFC
Frame material	Rolled Steel frame; Aluminum end bell	Cast Iron	Rolled Steel	Rolled Steel w Al face; Cast Iron	Cast Iron	Rolled Steel	Cast Iron
End bracket material	Aluminum	Cast Iron	Aluminum	Aluminum, Cast Iron	Cast Iron	Aluminum	Cast Iron
Conduit box material	Steel	Cast Iron	Steel	Steel	Cast Iron	Steel	Steel (<326T) Cast Iron (>364T)
Fan guard material	Steel	Steel	Polypropylene	None (all ratings TENV)	Cast Iron	Plastic	Polyprop. (<286T) Cast Iron (>324T)
Fan material	Plastic	Plastic (143T/TC - 445/7T) Aluminum (449T)	Polypropylene	None (all ratings TENV)	Polypropylene	Plastic	Polypropylene
Lead termination	Conduit box	Conduit box	Conduit box except Terminal block - 1/4 hp	Conduit box	Conduit box	Conduit box	Conduit box
Standard mounting	C-Face with Removable Rigid Base	Rigid Base (C-Flange kit available) C-Face with Rigid Base (1-100 hp)	C-Face with Rigid Base & C-Face Round Body	C-Face with Rigid Base	C-Face with Rigid Base	C-Face with Rigid Base	Rigid Base
Drive end shaft slinger	Yes	Yes	No	No	Yes	Yes	Yes
Paint	Black	Epoxy primer / Synthetic alkyd enamel	Black powder-coat	Black enamel	Blue enamel	Blue enamel	epoxy paint
Bearings	Ball	1-75 hp: Ball 100-300 hp: Roller	Ball (C3 fit)	Ball (C3 fit)	Ball (C3 fit)	Ball	Ball (C3 fit)
Grease	Exxon Polyrex EM						
Standard conduit box assembly position	F1	F1 some sizes reversible to F2	F3	F1, reversible to F2	F1, reversible to F2	F3	F1
Performance Characteristics							
Constant Torque speed range	2:1	2:1	20:1 (TEFC) 1000:1 (TENV)	1000:1 (TENV)	2000:1 (all enclosures)	10:1	20:1
Variable Torque speed range	5:1	5:1	-	-	-	10:1	-
Constant Horsepower speed range	1.5:1	1.5:1	2:1	2:1 (90-120Hz intermittent @50% duty cycle)	2:1	2:1	2:1
Temperature rise	B	B	B	F	F (TEFC) and B (TEBC)	F	B
Encoder provisions	No	No	No	Yes	Yes	No	No
Other Characteristics							
Agency listings	$_cCSA_{US}$	CE, $_cCSA_{US}$, EPACT	UL Recognized and CSA Certified				
Warranty*	2 years		3 years (through Marathon Electric)				

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.

3) Marathon warranty service can be arranged through Marathon Electric service centers. See list of service centers on our web site at www.automationdirect.com.

STABLE AC Motor Slide Bases

Mounting Slide Bases for 56 to 449T NEMA Motors

Features

- Allows adjustment of motor mounting position
- Double adjusting screws for frames 182T - 449T
- Manufactured to precise dimensional standards
- Dimensionally interchangeable with existing major makes
- Heavy-duty steel construction
- Painted with oven-baked primer for better adhesion of customer's paint
- All "D" bolts (motor mounting bolts) are fixed to the exact motor foot pattern
- All "D" bolts are welded into position to prevent spinning and dropping from slots
- Bases are provided with washers

Motor Slide Bases											
Part Number	Price	Fits Frame Type	Shipping Weight (lb)	Fits Motor							
				IronHorse	Marathon micro -MAX	Marathon Black Max 230/460V	Marathon Black Max 575V	Marathon Blue Max	Marathon NEMA Premium XRI	Marathon Blue Chip XRI 230/460V	Marathon Blue Chip XRI 575V
MTA-BASE-W56	<--->	56	3.5	MTR-xxx-1AB18 MTR-xxx-3BD18 MTR-xxx-3BD36	Y500 Y360 Y364	Y592(-A772) Y534(-A772) Y535(-A772)	Y555(-A772) Y556(-A772)	–	E2000	–	–
MTA-BASE-W143T	<--->	143T/TC	5.0	MTC-001-3BD18(CK) MTC-1P5-3BD36	–	Y536(-A772)	–	–	E2001 E2003	–	–
MTA-BASE-W145T	<--->	145T/TC	5.6	MTC-001-3BD12 MTC-1P5-3BD18(CK) MTC-002-3BD18(CK) MTC-002-3BD36	Y368	Y537(-A772) Y538(-A772) Y551(-A772)	Y557(-A772)	–	E2002 E2004 E2006 E2007	–	–
MTA-BASE-W182T	<--->	182T/TC	10	MTC-1P5-3BD12 MTC-003-3BD18(CK) MTC-003-3BD36	Y999	Y541(-A772)	Y558(-A772)	–	E2005 E2009 E2010	–	–
MTA-BASE-W184T	<--->	184T/TC	10	MTC-002-3BD12 MTC-005-3BD18(CK) MTC-005-3BD36	Y372	Y540(-A772) Y543(-A772)	Y559(-A772)	–	E2008 E2012 E2013	–	–
MTA-BASE-W213T	<--->	213T/TC	15	MTC-003-3BD12 MTC-7P5-3BD18(CK) MTC-7P5-3BD36	Y994	Y542(-A772) Y545(-A772)	Y560(-A772)	–	E2011 E2015 E2016	–	–
MTA-BASE-W215T	<--->	215T/TC	16	MTC-005-3BD12 MTC-010-3BD18(CK) MTC-010-3BD36	Y996	Y544(-A772) Y547(-A772)	Y561(-A772)	–	E2014 E2018 E2019	–	–
MTA-BASE-W254T	<--->	254T/TC	20	MTC-7P5-3BD12 MTC-015-3BD18(CK)	–	Y546(-A772) Y549(-A772)	Y562(-A772)	–	–	E205	E307
MTA-BASE-W256T	<--->	256T/TC	21	MTC-010-3BD12 MTC-020-3BD18(CK)	–	Y548(-A772) Y552(-A772)	Y563(-A772)	–	–	E206	E308
MTA-BASE-W284T	<--->	284T/TC	23	MTC-025-3BD18(CK)	–	Y553(-A772)	Y567(-A772)	–	–	E207	E309
MTA-BASE-W286T	<--->	286T/TC	24	MTC-030-3BD18(CK)	–	Y393(-A772)	Y394(-A772)	–	–	E208	E310
MTA-BASE-W324T	<--->	324T/TC	33	MTC-040-3BD18(CK)	–	–	–	Y571(-A774) Y513(-A775)	–	E209	E311
MTA-BASE-W326T	<--->	326T/TC	35	MTC-050-3BD18(CK)	–	–	–	Y572(-A774) Y514(-A775)	–	E210	E312
MTA-BASE-W364T	<--->	364T/TC	46	MTC-060-3BD18(CK)	–	–	–	Y573(-A774) Y515(-A775)	–	E211	E313
MTA-BASE-W365T	<--->	365T/TC	47	MTC-075-3BD18(CK)	–	–	–	Y574(-A774) Y516(-A775)	–	E212	E315
MTA-BASE-W404T	<--->	404T/TC	64	–	–	–	–	–	–	–	–
MTA-BASE-W405T	<--->	405T/TC	65	MTC-100-3BD18(CK)	–	–	–	Y575(-A774) Y517(-A775)	–	E213	E314
MTA-BASE-W444T	<--->	444T	69	MTC-125-3BD18	–	–	–	–	–	–	–
MTA-BASE-W445T	<--->	445T	70	MTC-150-3BD18	–	–	–	–	–	–	–
MTA-BASE-W447T	<--->	445/7T 447T	92	MTC-200-3BD18	–	–	–	–	–	–	–
MTA-BASE-W449T	<--->	449T	98	MTC-250-3D18 MTC-300-3D18	–	–	–	–	–	–	–