IronHorse ES1 Series AC Drive

Overview

The Ironhorse ES1® Series brings ease of use to a whole new level for 120/230V single phase input applications up to 2HP. This VFD utilizes simple one turn trimpots for quick setup of acceleration, deceleration, overload, and more. This is a great feature for those who don't want parameters or software to deal with. Volts/Hz control with torque boost is used to power any 3-phase, 230 VAC inverter duty AC motor. The Ironhorse ES1® comes in two styles – a stand-alone NEMA 4X enclosed model with speed control and optional forward/reverse, or an open chassis model for control panel installations. All models include relay output contacts. The ES1® is designed for simple implementation and reliable performance, meeting the demands of small industrial applications.

Features

- Simple setup ; 7 trimpots to configure all VFD settings. No parameters or software
- Supports constant and variable torque applications up to 6 A (2 hp)
- NEMA 4X frame models include built-in speed potentiometer, on/off switch, and with or without forward/reverse switch
- Open chassis models for cabinet installation
- Dual-voltage input accepts 115 VAC or 208/230 VAC @ 50/60 Hz
- Spring clamp terminals for control inputs and outputs
- 1/4 inch male spade terminals for supply voltage and motor connections
- Digital inputs for Run, Foward/Reverse, and DC injection braking inputs
- Relay output on all models
- Transient voltage protection

Typical Applications

- Conveyors
- Fans
- Blowers
- Pumps
- Compressors

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Ironhorse ES1 Drive Feature Overview

Model	Price	Amperage Rating (A)	Reversing	Chassis Type	Description	Drawing
ES1-3A-N4	$255.00	3	Field-install	NEMA 4X	IronHorse ES1 series AC general purpose drive, NEMA 4X, 120 VAC and 230 VAC, 3/4 hp with 1-phase input, V/Hz mode, 1 frame.	PDF
ES1-3A-N4R	$294.00	3	Built-in	NEMA 4X	IronHorse ES1 series AC general purpose drive, NEMA 4X, 120 VAC and 230 VAC, 3/4 hp with 1-phase input, V/Hz mode, 1 frame.	PDF
ES1-3A-C	$214.00	3	Field-install	Open	IronHorse ES1 series AC general purpose drive, open frame, 120 VAC and 230 VAC, 3/4 hp with 1-phase input, V/Hz mode, 1 frame.	PDF
ES1-6A-N4	$398.00	6 or 4.5	Field-install	NEMA 4X	IronHorse ES1 series AC general purpose drive, NEMA 4X, 120 VAC and 230 VAC, 2 hp @ 230 VAC or 1 hp @ 120 VAC with 1-phase input, V/Hz mode, 1 frame.	PDF
ES1-6A-N4R	$436.00	6 or 4.5	Built-in	NEMA 4X	IronHorse ES1 series AC general purpose drive, NEMA 4X, 120 VAC and 230 VAC, 2 hp @ 230 VAC or 1 hp @ 120 VAC with 1-phase input, V/Hz mode, 1 frame.	PDF
ES1-6A-C	$244.00	6 or 4.5	Field-install	Open	IronHorse ES1 series AC general purpose drive, open frame, 120 VAC and 230 VAC, 2 hp @ 230 VAC or 1 hp @ 120 VAC with 1-phase input, V/Hz mode, 1 frame.	PDF

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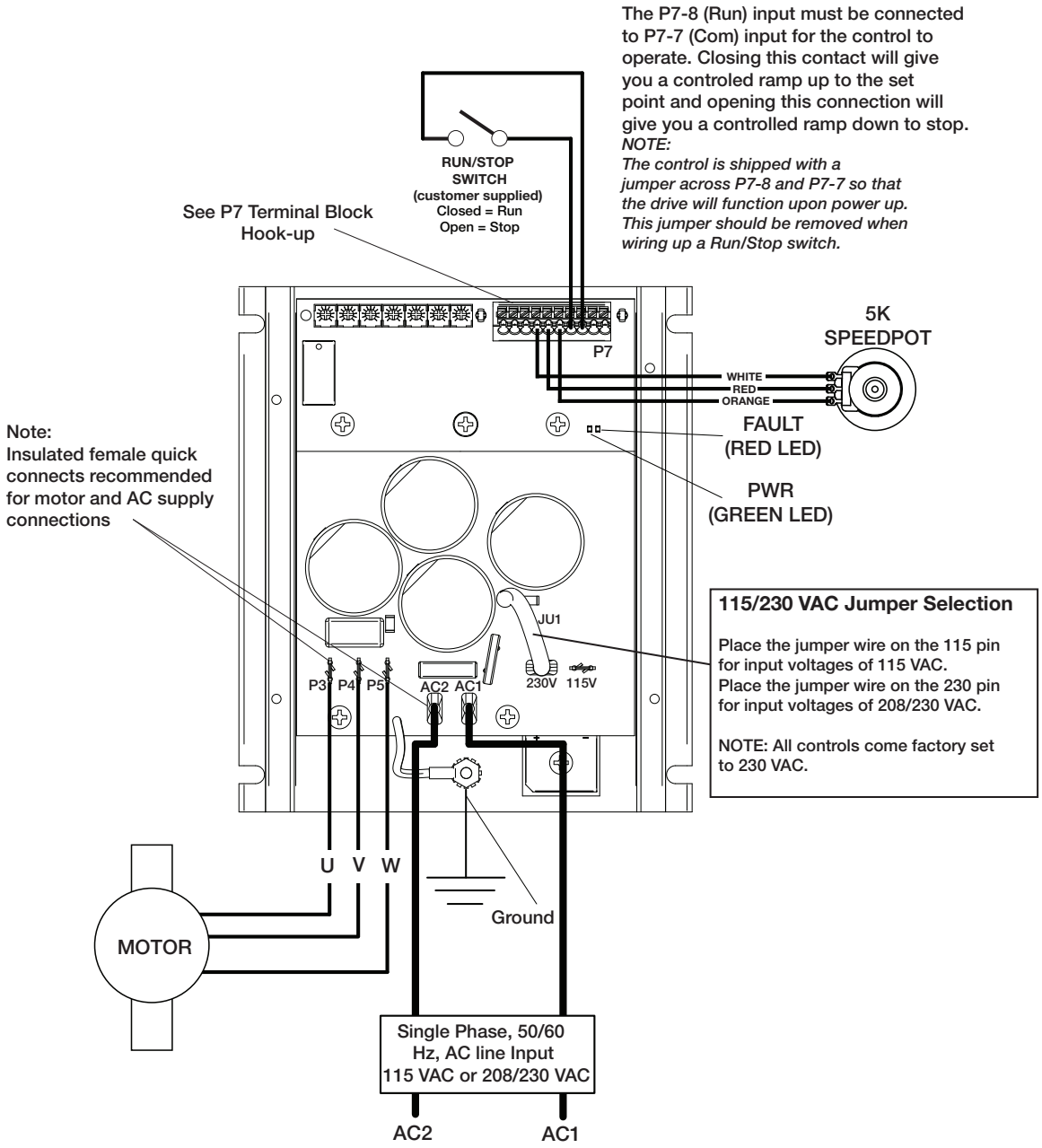
Ironhorse ES1 Class Specifications							
Part Number			ES1-3A-N4	ES1-3A-N4R	ES1-3A-C	ES1-6A-N4	ES1-6A-N4R	ES1-6A-C
Price			$255.00	$294.00	$214.00	$398.00	$436.00	$244.00
Drawing Link			PDF	PDF	PDF	PDF	PDF	PDF
Frame Size			1					
Housing Type			NEMA 4X		Open	NEMA 4X		Open
Applied Motor (hp)[1]	**115 V 1-phase Input**		0–0.75			1		
	230 V 1-phase Input		0.75			2		
Output Rating	**Output Rated Current (Amps)**	**115 V 1-phase Input[2]**	3.0			4.0		
		230 V 1-phase Input[2]	3.0			6.0		
	Output Voltage		230 VAC. 3-phase effective, ~340 Vpk PWM @ 8 kHz					
	Output Frequency		0–60 Hz 60.1–120 Hz with derating[3]					
Input Rating	**Input Rated Current (Amps)**	**115 V 1-phase Input[2]**	10.3			14.8		
		230 V 1-phase Input[2]	6.5			11.9		
	Input Voltage[2]		115 VAC ±10% 230 VAC 1-phase +5%/-10%					
	Input Frequency		48–62 Hz					
	Speed Voltage Signal Input (Pot Wiper or Isolated Voltage Signal)		0–5 VDC					
Control	**Control Method**		V/Hz control, torque boost					
	Overload Capacity		Manual with Trimpot setup, max 120% of rated drive current default					
	Torque Boost		Manual with trimpot setup					
	Boost Slope		3 V / Hz					
Operating Characteristic	**Frequency Setting Signal**		0–5 VDC, Pot Wiper or Isolated Voltage Signal Potentiometer included					
	Main Functions		Min, Max, Boost, Acceleration, Deceleration, Current Limit, DC Injection Braking					
	I/O	**Input**	3 – Run, Fwd/Rev, Brake					
		Run Relay Output	Form C SPDT contacts / NC or NO, 1 A @ 30 VDC or 120 VAC max					
Onboard Power Supply (Externally Accessible)			5 V @ 25 mA					
Carrier Frequency			8 kHz					
Reversing			Field-install	Built-in	Field-install	Field-install	Built-in	Field-install
Connector Style			1/4 inch male spade terminals for supply voltage and motor Spring clamp terminal for P7 terminal and Run Relay Out terminal contacts					
Housing Material			6063-T6 aluminum / Sabic NORLY TYPE N190					
Dimensions			Length: 7.150 inches [181.61 mm] Width: 5.53 inches [140.46 mm] Height: 5.942 inches [150.93 mm]					
Weight			3.08 lbs [1.4 kg]	3.10 lbs [1.41 kg]	2.35 lbs [1.07 kg]	3.30 lbs [1.5 kg]	3.36 lbs [1.52 kg]	2.59 lbs [1.17 kg]
Agency Approvals			UL E198015					

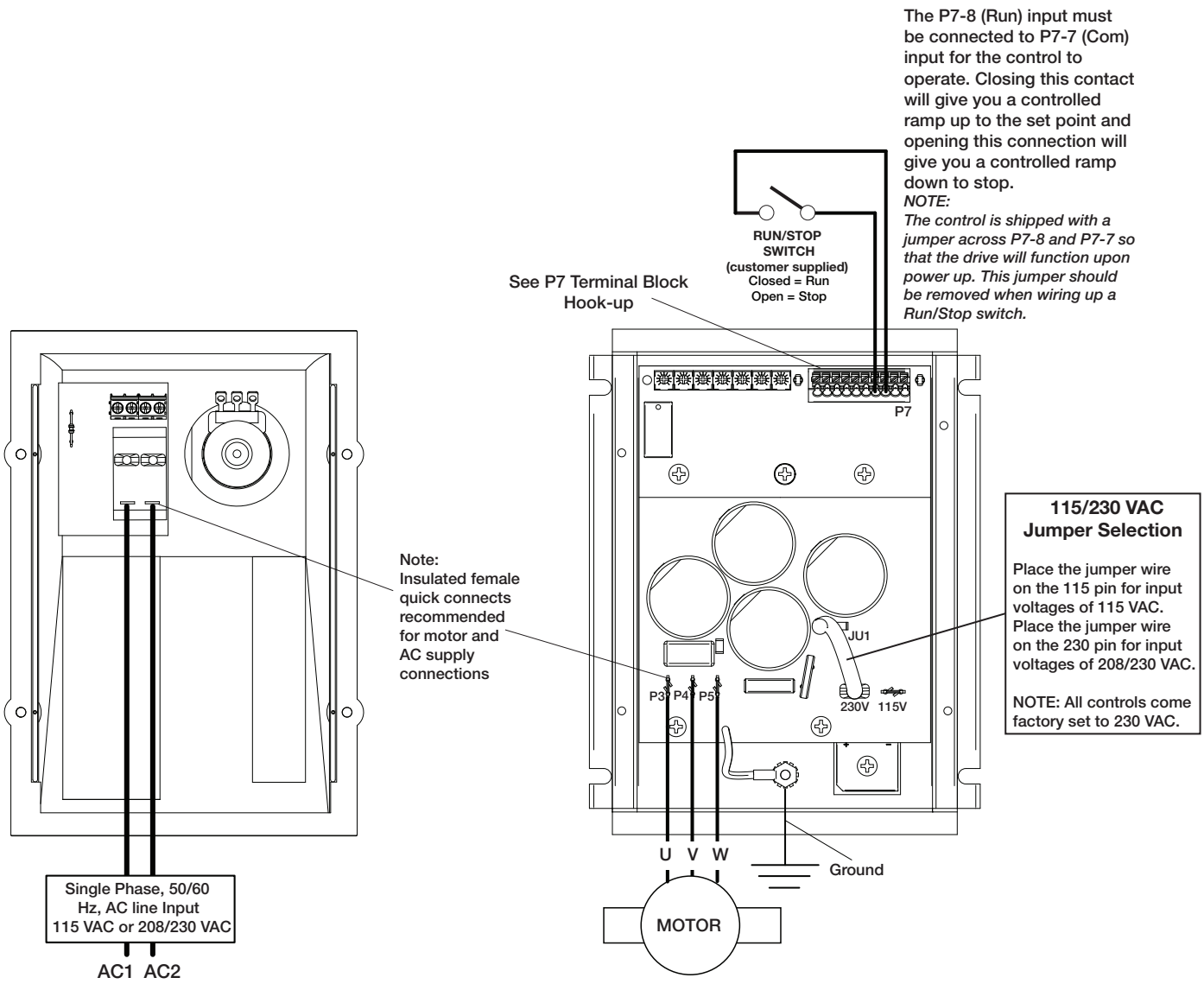
1. The standard motor capacity is based on a standard 4-pole motor. Choose your ES1 model based on rated amps of the motor. Choose a larger size for extra capacity in case of higher loads.
2. Jumper selectable, factory set to 230 VAC. Change jumper to use 115 VAC input.
3. Derate up to 20%; see derate curve for output frequencies above 60 Hz.

Environmental Conditions for IronHorse ES1 Series AC Drives	
Operating Temperature Range	Open chassis: -10 to +45 °C [+14 to +113 °F] NEMA 4X: -10 to +35 °C [+14 to +95 °F]
Operating Humidity Range	95%, non-condensing
Operating Altitude	6562 ft [2000 m]

Open Chassis Wiring Diagram

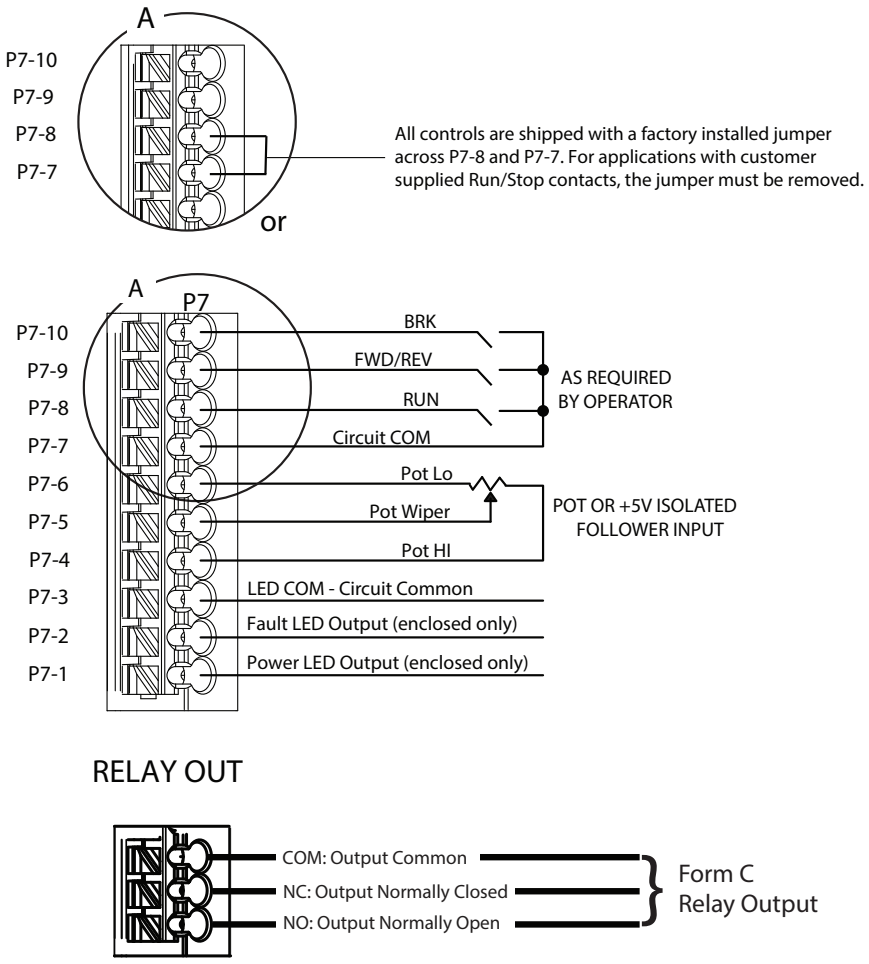


NEMA 4X Wiring Diagram



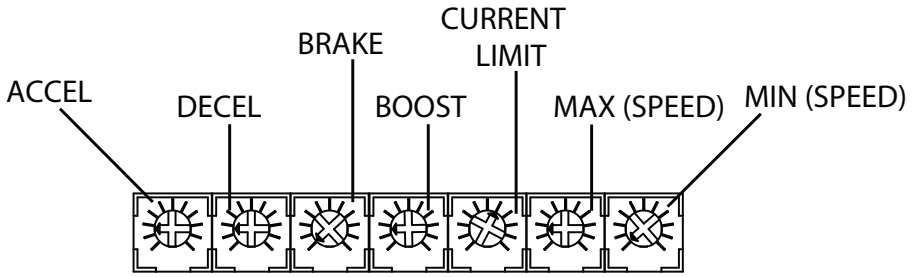
IronHorse ES1 Series AC Drive

Terminal Block Wiring Diagram



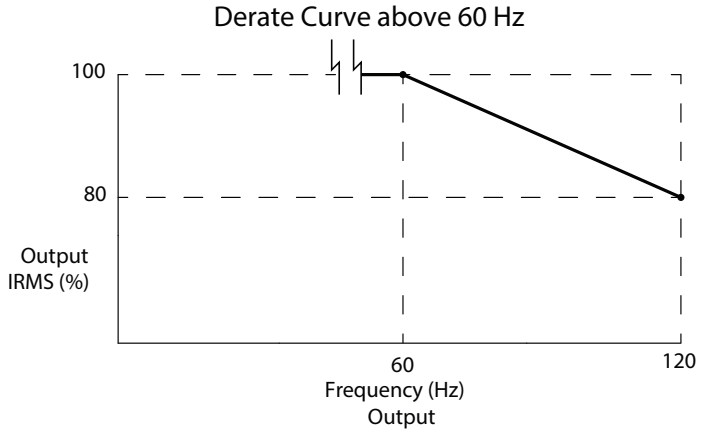
Terminal Block	Description
P7-1	Power LED output (NEMA4X only).
P7-2	Fault LED output (NEMA4X only).
P7-3	LED COM – circuit common used for LED return on NEMA4X models.
P7-4	HI: +5 V pot Hi connection for 5K ohm speed pot.
P7-5	W: Wiper connection for 5K ohm speed pot. This input can also accept a 0–5 VDC isolated signal input. The wiper input can be used to reset a CL or fault shutdown by bringing the wiper input from above 50% down to zero.
P7-6	LO: Circuit connection for pot LO of the 5K ohm speed pot or common return for isolated 0–5 VDC signals.
P7-7	COM: Circuit common (Logic 'Low') connection for Run, Brake, and Reverse inputs.
P7-8	RUN: This input floats 'Logic High' – must be connected via switch or jumper to P7-7 (Common) for drive to Run. This input can also be used to clear a CL or fault shutdown by opening the Run terminal and then closing it to COM again. NOTE: Normal operation run and stop functions should always be performed using this Run/Stop input and not by turning on and off the VAC input power.
P7-9	FWD/REV: To change motor direction, this input must be connected to P7-7 (Common).
P7-10	BRK: When connected to P7-7 (Common) the motor will decel to a stop and then provide DC injection braking at the rate set by the BRK trimpot. Note that a full ccw Brake trim pot setting disables braking.

Available Trimpot Settings



Drive Derating

Operating a motor above the rated speed may result in some motors running hotter than normal. When operating a motor beyond its normal speed range, consult the motor manufacturer to determine if de-rating or additional cooling methods may be required.



Customer Installed Fusing

The motor and control are protected against overloads by the current limit circuit, however this drive does not contain AC line fuses. Most electrical codes require that each hot AC Line conductor contain circuit protection. Install a fuse (see fusing chart below) or a circuit breaker in series with each hot AC Line. Do not fuse any of the motor leads. For recommended fuse size and a suggested fuse from AutomationDirect, see the chart below.

Model	Motor hp (FLA) at 230 VAC	120 VAC Input		230 VAC Input	
		A	Bussman Fuse	A	Bussman Fuse
ES1-3A-xxx	0.25 hp (1.2 A)	4	ABC4	3	ABC3
	0.5 hp (1.8 A)	8	ABC8	5	ABC5
	0.75 hp (2.8 A)	12	ABC12	7.5	ABC8
ES1-6A-xxx	1.0 hp (3.2 A)	15	ABC15	10	ABC10
	1.5 hp (4.5 A)	18	ABC20	12	ABC12
	2.0 hp (6.0 A)	–	–	15	ABC15