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Product Description

Cutler-Hammer® NFX9000 adjustable frequency AC Drives from Eaton’s electrical business are designed to provide adjustable speed control of three-phase motors. These micro-processor-based drives have standard features that can be programmed to tailor the drive’s performance to suit a wide variety of application requirements.

The NFX9000 volts-per-hertz product line utilizes a 32-bit microprocessor and insulated gate bipolar transistors (IGBTs) which provide quiet motor operation, high motor efficiency and smooth low speed performance. The size and simplicity of the NFX9000 make it ideal for hassle free installation where size is a primary concern.

Models rated at 240 volts, single- or three-phase, 50/60 Hz are available in sizes ranging from 1/4 to 2 hp. Models rated at 115 volts, single-phase, 50/60 Hz are available in the 1/4 to 1/2 hp size range.

The standard drive includes a digital display, operating and programming keys on the keypad.

The display provides drive monitoring as well as adjustment and diagnostic information. The keys are utilized for digital adjustment and programming of the drive as well as for operator control. Separate terminal blocks for control and power wiring are provided for customer connections. The drives feature RS-485 serial communications.

Features and Benefits

Table 40-1. Features and Benefits

Feature	Customer Benefit
V/Hz Control.	Provides 150% starting torque and advanced low speed control.
Clearly laid out and easy to understand keypad with 4-character LED display, 4 status indicating LEDs, speed potentiometer, and 5 function keys.	Most informative operator’s interface in this class of VFD, provided as standard. All parameters, diagnostic information and metering values are displayed with a bright 4-character LED display.
1 analog input 4 programmable, intelligent digital inputs 1 programmable relay	Provide enhanced application flexibility.
Serial communication port (RS-485).	Direct connection to serial communications networks.
Single-phase or three-phase input capability on 115/240V AC rated units.	Operate three-phase motor with single-phase supply.



Model NFX9000

Technical Data and Specifications

Output Ratings

- Horsepower;
 - 90V – 132V, 1/4 – 1/2 hp
 - 200 – 240V, 1/2 – 2 hp
- Frequency Range: 0.1 – 400 Hz
- Overload Rating: 150% for 60 seconds
- Frequency Resolution:
 - Digital: 0.1 Hz
- Frequency Accuracy
 - Digital: $\pm 0.01\%$ of max. frequency
 - Analog: $\pm 0.2\%$ of max. frequency
- Undervoltage Carryover Limit: 0.3 to 25 seconds

Motor Performance

- Motor Control: V/Hz
- Constant Torque: Standard
- Speed Regulation: 0.5% of base speed

Input Power

- Voltage at 50/60 Hz ± 3 Hz
 - 100V – 120V, -10% +10% / 1-phase
 - 200V – 240V, -10% +5% / 1-phase
 - 200V – 240V, -10% +5% / 3-phase
- Displacement Power Factor: Better than 0.95
- Efficiency: Typically greater than 95%

Design Type

- Microprocessor: 32-Bit
- Converter Type: Diode
- Inverter Type: Insulated Gate Bipolar Transistor
- Waveform: PWM Volts/Hertz

Environment

- Operating Temperature:
 - -10°C to +40°C
- Humidity: 20 to 90% non-condensing
- Maximum Elevation: 1000 meters (3300 ft.)

Codes and Standards

- NEMA, IEEE, NEC: Design Standards
- UL Listed
- cUL Listed
- CE Marked

Enclosure

- Standard: Protected Chassis (IP20)

Protective Features

- Ground Fault: Standard
- Overload Protection: Standard
- Overcurrent: Standard
- Overvoltage: Standard
- Undervoltage: Standard
- Overtemperature: Standard
- Overload Limit: Standard

Set Up Adjustments, Performance Features, Operator Control and External Interface

Keypad

- Alphanumeric Display: Standard, 1 x 4 character
- Digital Indications: RUN/STOP and FORWARD/REVERSE
- Diagnostics: Last 3 trips with cause
- LED Status Indicators: 4 (RUN/STOP and FORWARD/REVERSE)
- Operator Functions: RUN/STOP, Speed control (digital or potentiometer), RESET, MODE Keys and ENTER.

I/O Terminal Block

- Analog Inputs:
 - 1 Input: 0 – 10V DC, 4 – 20 mA
 - Potentiometer: 1K ohm to 2K ohm
 - Analog Voltage: Nominal 10V DC (10K ohm input impedance)
 - Analog Current: Nominal 4 – 20 mA (250 ohm)
- Digital Inputs: 4 Programmable Inputs
- Digital Outputs: 1 Form A Relay contact

Programmable Parameters

- Out of the Box: Factory settings loaded for quick start-up.
- Accel. and Decel.: 2 separately adjustable Linear or S Curve times: 0.1 – 600 seconds
- DC Injection Braking
- External Fault: Terminal input
- Jog: Terminal input
- Fault Reset: STOP/RESET or terminal input
- I/O: NO/NC Selectable
- Jump Frequencies: 3 (with adjustable width)
- Parameter Security: Programmable software lock
- Preset Speeds: 2 preset speeds
- Reversing: Keypad or terminal
- Speed Setting: Keypad, terminal or pot
- RUN/STOP Control: Keypad or terminal
- Stop Modes: Decel, coast or DC injection

Reliability

- Pretested Components: Standard
- Surface Mount Technology: Standard (PCBs)
- Computerized Testing: Standard
- Final Test with Full Load: Standard
- Eaton's Cutler-Hammer Engineering Systems and Service: National network of AF drive specialists

Table 40-2. Watts Loss

Horsepower	Catalog Number	Volts	Watts Loss
			9 kHz
1/4 1/2	NFXF25A0-1 NFXF50A0-1	115V AC	20W 20W
1/4 1/2 1 2	NFXF25A0-2 NFXF50A0-2 NFX001A0-2 NFX002A0-2	230V AC	20W 20W 38W 75W

Wiring Diagrams

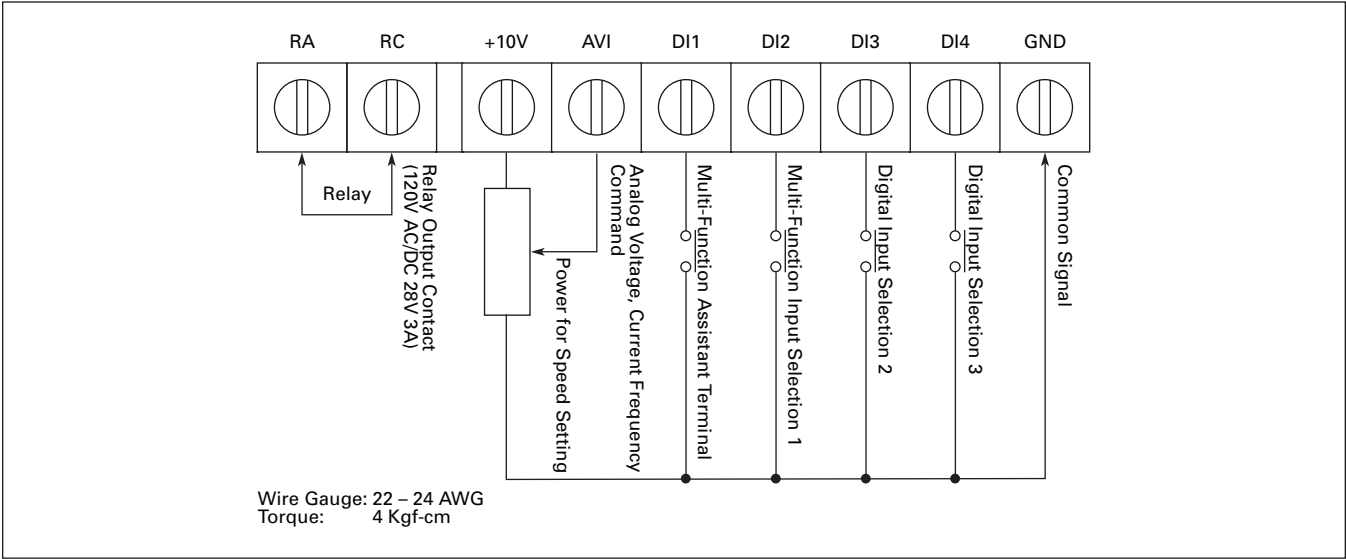


Figure 40-1. Control Terminal Wiring (Factory Settings)

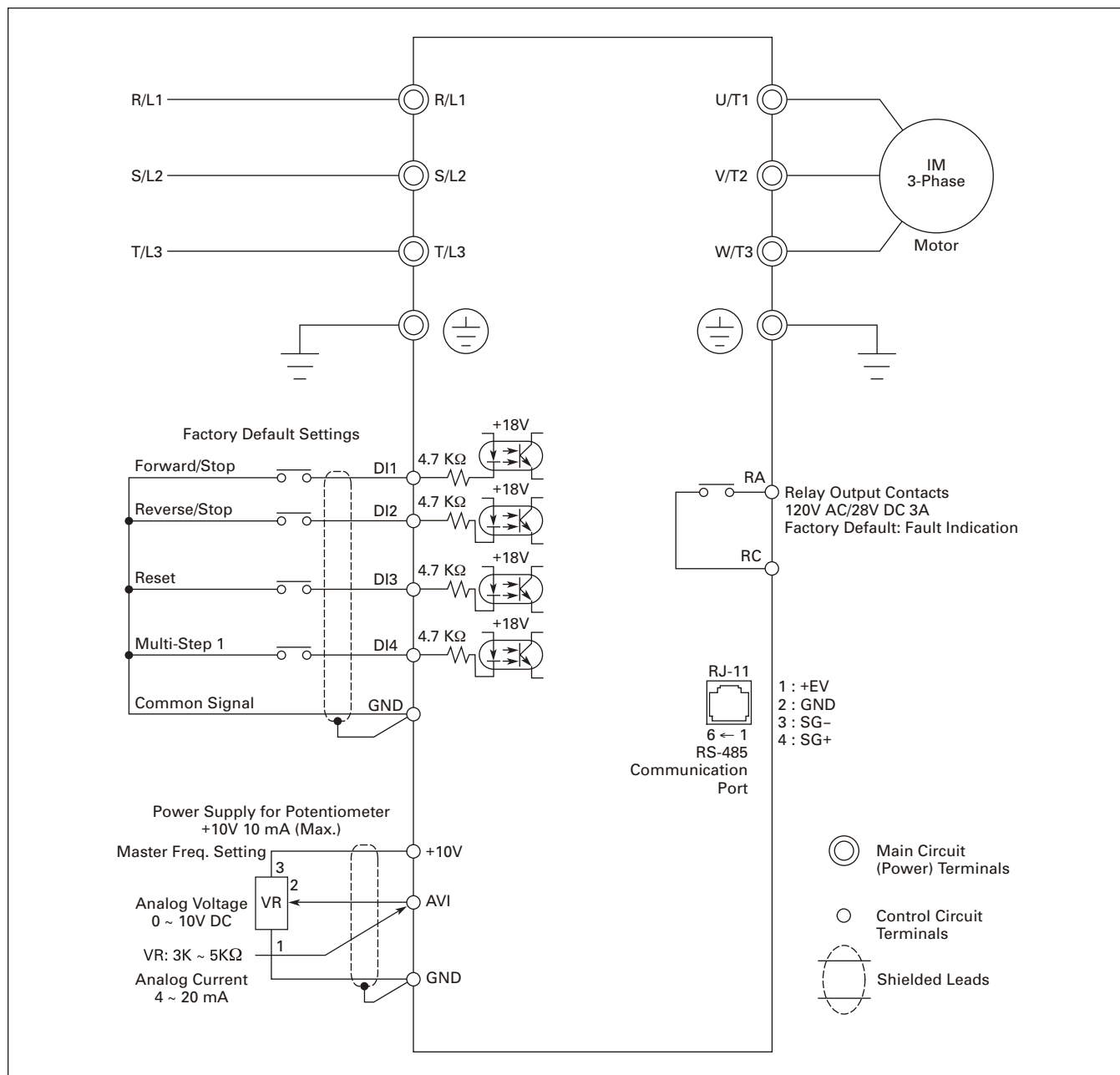


Figure 40-2. Basic Wiring Diagram

Note: Do not plug a modem or telephone line to the RS-485 communication port, permanent damage may result. Terminals 1 and 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

- Use power terminals R/L1 and S/L2 for single-phase connection to models: NFXF25A0-1, NFXF50A0-1, NFXF25A0-2, NFXF50A0-2 or NFX001A0-2.
- Use power terminals R/L1, S/L2 and T/L3 for three-phase connection to models: NFXF25A0-2, NFXF50A0-2, NFX001A0-2 or NFX002A0-2.
- Single-phase power must not be used for model NFX002A0-2.

Dimensions

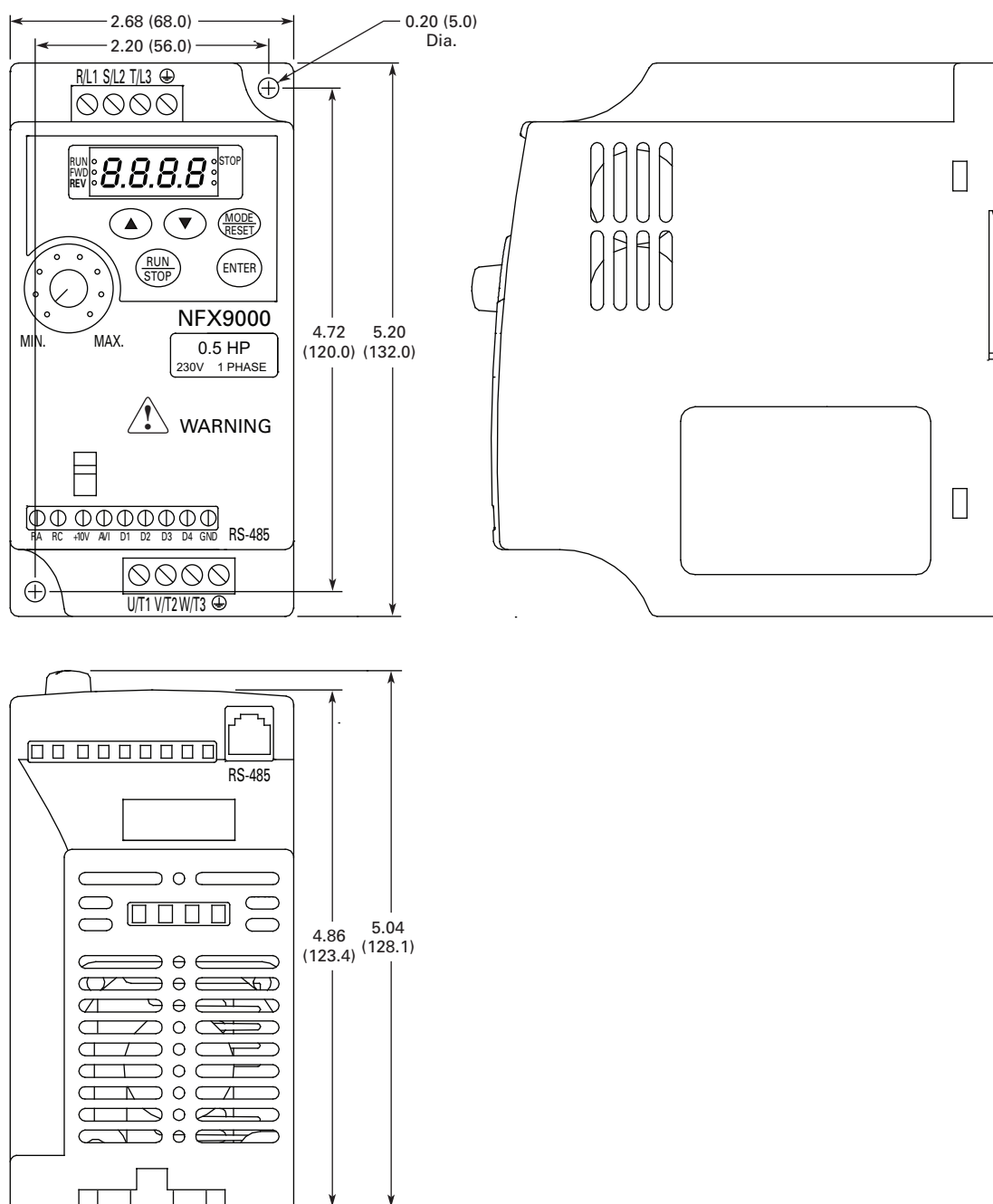
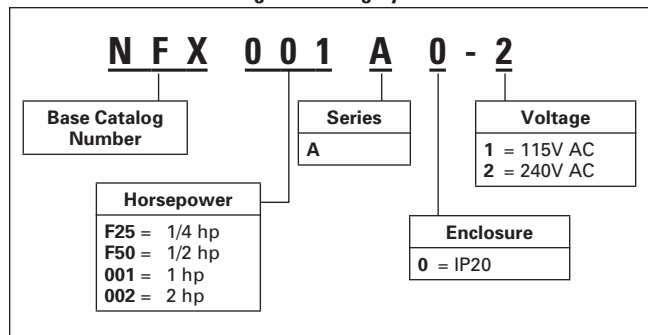


Figure 40-3. 1/4 to 2 hp Drive Approximate Dimensions in Inches (mm)

Catalog Number Selection

Table 40-3. NFX9000 Catalog Numbering System



Product Selection

Table 40-4. NFX9000 Basic Controller IP20

Description		Input	Continuous	Catalog	Price
hp ^①	Volts ^②	Ampere Single-/ Three-Phase Rating	Output Amp Rating	Number	U.S. \$
1/4 1/2	90 – 130	6.0/— 9.0/—	1.6 2.5	NFXF25A0-1 NFXF50A0-1	
1/4 1/2 1 2	200 – 240	4.9/— 6.5/— 9.7/— —/9.0	1.6 2.5 4.2 7	NFXF25A0-2 NFXF50A0-2 NFX001A0-2 NFX002A0-2	

- ① Horsepower ratings are based on the use of a 240V or 480V NEMA B, 4- or 6-pole squirrel cage induction motor and are for reference only. Units are to be selected such that the motor current is less than or equal to the NFX9000 rated continuous output current.
- ② For 208V, 380V or 415V applications, select the unit such that the motor current is less than or equal to the NFX9000 rated continuous output current.