



Model NF90 Controller

The NF90 is a low cost programmable stepping motor controller for running three motors, one-at-a-time. The Controller incorporates a single chip "Super Microprocessor" that has on-chip RAM. The RAM is available for temporary storage of a user-entered program and motion parameters.

Commands and data are entered through the RS-232 interface from a host computer, terminal, or programmable controller. Specialized Commands provide simple and efficient entry of a complex, yet compact, program.

Features

- ✓ A complete microprocessor-based Controller with motor drives for one, two, or three motors.
- ✓ Low cost and small size
- ✓ 400 steps per revolution (0.9° step angle) resolution
- ✓ Linear type motor and logic power supplies result in low Electromagnetic Interference (EMI).
- ✓ A Digitizing function can be utilized with a host terminal connected as a readout of motor position.
- ✓ A three wire RS-232 allows a host to enter Commands (ASCII characters) and Data, Poll for status, and Read Position information.
- ✓ The NF90 will run in an interactive or stand-alone mode.
- ✓ Acceleration/Deceleration settable from 2,000 to 100,000 steps/sec² in 2,000 step/sec² increments.
- ✓ Speed programmable from 1 to 6000 steps/sec. in 1 step/sec increments. NOTE: Most motors have low torque above 2000 steps/sec.
- ✓ Incremental Index distance is programmable from ±1 to ±1,048,575 steps.
- ✓ Programmable Return-to-Zero position.
- ✓ Six powerful Loop Commands provide from one to continuous repeat operations, performing simple functions like auto-reverse, raster scans and other complex XY matrix patterns.
- ✓ Programmable pauses from 100 milliseconds to 13 minutes.
- ✓ A User Output can be programmed to turn On and Off an external solid state relay, or interface to other logic level devices.
- ✓ A User Input can be utilized in a program as a WAIT for external switch or relay closure.
- ✓ Backlash Compensation can be set to automatically finish every index approaching from the positive direction.
- ✓ Run, Limit switch, Joystick, Output, Input, RS-232 and Motor connections are accessible at unpluggable connectors on the front panel.
- ✓ RS-232 baud rate settings are switch settable to 300, 1200, 4800, or 9600.
- ✓ Terminal, Diagnostic and BASIC, C, and Pascal Example Programs for PCs on diskette are included.

Features continued

- ✓ A User program can be put in EPROM by Velmex for a nominal fee.
- ✓ As many as 255 controllers can be "daisy-chained" together allowing the host to address each one from just one serial port.
- ✓ The NF90 can be set to signal the host when a limit switch has been encountered.
- ✓ Automatic Power Down reduces power consumption by de-energizing the motors when at a standstill.
- ✓ Single Step mode is provided for debugging a program or as a controlled interrupt.

- ✓ Completely wired and tested for direct connection to UniSlide Motors /Assemblies.
- ✓ The NF90 can be polled for its status at any time; additionally a prompt ("^") is automatically sent to the host when a program has finished.
- ✓ The NF90 can be programmed to send a pulse or character at preset distances without stopping or slowing the motor.
- ✓ Motor position can be read while motor is in motion.
- ✓ Limit Switches for CW and CCW directions are provided with plug-in connection to UniSlide limit switch assemblies. Limits can be used for "homing."
- ✓ Two year Limited Warranty.

SPECIFICATIONS

FUNCTIONAL

Packaged Controller/Driver, using Microcomputer control of stepping motors. Unipolar series resistance (L/R) driver. Operates one to three (dependent on model) motors, one-at-a-time.

Interactive limit switch inputs (TTL), (CW and CCW for each axis).

One User Input (0V to +3V min., -25V to +25V max.), and one User Output (0 or +5V, 10 mA sinking and 3 mA sourcing capability).

Programming through full-duplex RS-232-C; 300,1200,4800,9600 Baud (switch settable), 7 Data bits, Even parity, 2 Stop bits, ASCII; special configurations with 8 data bits, odd or no parity, are available.

User available RAM for program storage is 101 bytes.

Remote Run and Jog Inputs (TTL).

Eight foot motor and limit switch cables with connectors.

MOTOR COMPATIBILITY

1.8° PM 6 or 8 lead stepping motors, 4.7 Amp/phase max. Factory matched for a particular motor current, motors on each axis to be the same Amp/phase value.

PHYSICAL

Weight: 7.2 lbs. (3.2 kg)

Height: 5.0 inches (12.7 cm)

Width: 10.8 inches (27.4 cm)

Depth: 7.8 inches (19.8 cm)

ELECTRICAL REQUIREMENTS

90 to 130 VAC 50/60Hz, 150 watts

210-250V 50 Hz. available on request

ENVIRONMENTAL

35° to 95° F (2° to 35° C) Convection cooled

MODELS

Model # NF90-1 One motor version

Model # NF90-2 Two motor version

Model # NF90-3 Three motor version

OPTIONS

Remote Manual Push-button Control

19" Rack Mount Kit

15' Communication Cable for PCs (DB9 connector with DB9 to DB25 Adapter).

Command Summary

| Command | Function | Command | Function |
|--------------|--|--|---|
| ImMx | Set steps to Index a motor CW (positive), <i>m</i> = motor# (1,2,3), <i>x</i> =1 to 1048575 | Q | Quit On-Line mode (return to Jog/Slew mode) |
| ImM-x | Set steps to Index a motor CCW (negative), <i>m</i> = motor# (1,2,3), <i>x</i> =1 to 1048575 | R | Run program |
| ImM0 | Index a motor to absolute zero position, <i>m</i> =motor# (1,2,3) | N | Null (zero) motors 1,2,3 absolute position registers |
| SmMx | Set Speed of a motor, <i>m</i> = motor# (1,2,3), <i>x</i> =1 to 6000 steps/sec. | K | Kill operation in progress |
| AmMx | Acceleration/deceleration , <i>m</i> = motor# (1,2,3), <i>x</i> =1 to 50 | V | Verify Controller's status, NF90 sends "B" to host if busy, or "R" if ready |
| L0 | Loop continually from the beginning | C | Clear program from memory |
| L-0 | Sets the Loop-to-marker at the current location in the program | D | Decelerate to a stop (interrupts current index in progress) |
| Lx | Loop from beginning or Loop-to-marker <i>x</i> -1 times (<i>x</i> =2 to 255) | E | Enable On-Line mode with echo on |
| L-x | Loop from beginning or Loop-to-marker <i>x</i> -1 times, alternating direction of motor 1 | F | Enable On-Line mode with echo oFF |
| LM-2 | Loop once from beginning or Loop-to-marker reversing index direction of motor 2 | G | Go after waiting or holding |
| LM-3 | Loop once from beginning or Loop-to-marker reversing index direction of motor 1 and motor 2 | H | Put Controller on Hold (single step mode) |
| Px | Pause <i>x</i> tenths of a second and output if output enabled (<i>x</i> =0 to 8191, 10 µsec pause when <i>x</i> =0) | X | Send position of motor 1 to host |
| U0 | Wait for a "high" on the user input | Y | Send position of motor 2 to host |
| U1 | Wait for a high on the user input, holding the user output high while waiting | Z | Send position of motor 3 to host |
| U2 | Disable user output when pausing | The following are for NF90s that are daisy-chained together: | |
| U3 | Enable output when pausing (reset state) | | |
| U4 | User output "low" | [x] | Send commands to the next NF90 in the "chain", <i>x</i> are any of the above commands |
| U5 | User output high | & | Enable multiple NF90s that are daisy-chained |
| U6 | Send "W" to host and wait for a "G" to continue | | |
| U7 | Start of Continuous Index with pulse output | | |
| U8 | Start of Continuous Index sending "@" to the host | | |
| U9 | End of Continuous Index | | |
| Bx | Backlash compensation, compensation on when <i>x</i> =1, off when <i>x</i> =0 | | |
| Ox | Indicate limit switch O ver-travel to host, off when <i>x</i> =0, NF90 sends "O" when <i>x</i> =1 and a limit switch is encountered | | |