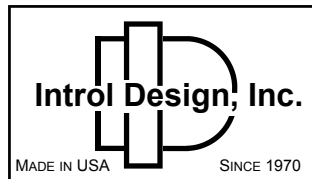


**MODEL DC100A-LCP  
BRUSHLESS MOTOR CONTROLLER  
AND LENGTH CONTROLLER**

**OPERATION MANUAL**



**OCTOBER 1998**

**INTROL DESIGN, INC.  
48 NORTH STREET  
LOCKPORT, NY 14094**

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**IMPORTANT**

This control has been designed as a component intended to be implemented in a control system. Introl Design, Inc. has no control over the numerous control schemes, therefore it is the responsibility of the user to install this device in a system with the safeguards in place to prevent personal injury or equipment damage. The user should comply with the National Electrical Code as well as any local or other applicable codes. Although every effort has been made to assure the accuracy of the information contained in this manual, Introl Design, Inc. accepts no liability whatsoever with respect to the information provided herein. There are no implied warranties of merchantability or fitness for a particular purpose that apply to the control described in this manual.

## REVISIONS LOG

Revision Number	Date	Description
01	4/97	Amendment to pages 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 & 24.
02	10/98	Manual reprinted (half size). Programming section rewritten. Optional operator interface section added.
03	1/99	Amendments to pages 7, 19, 20, 21, 22.
04	1/99	Amendments to pages 21, 22.
05	3/99	Amendments to pages 21, 22.

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**INTRODUCTION**

The Introl DC100A-LC is designed, developed, and manufactured by Introl Design, Inc. of Lockport, NY, USA. The brushless motor drive section is designed to control three phase brushless DC motors. Hall effect sensors supply commutation information, while encoder feedback supplies velocity and position information. All drive set up requirements are easy to understand potentiometer adjustments. The DC100 series has been designed as a low cost, high performance alternative to brush type controls or expensive servo systems, and is capable of controlling brushless DC motors up to 1½ hp. The length control card mounts internal to the DC100 series drives, converting it to a stand alone single axis controller. The length controller card utilizes differential encoder inputs with ×4 logic to provide 4000 counts per motor revolution of position resolution. All parameters can be programmed through a serial communication link with either a computer or one of Introl's operator interfaces.

Please take a few moments to read this manual before proceeding with any installation, and make sure you have no unanswered questions. Taking the time to spend a few moments understanding the controller may save hours of valuable time.

Copy the model and serial number into your instruction manual. You will need these numbers any time you call for assistance.

**Model Number** \_\_\_\_\_

**Serial Number** \_\_\_\_\_

**Date of Purchase and/or Installation** \_\_\_\_\_

1. Understand the rating of the drive and make sure it is what you have ordered, and matches your input line voltage and motor rating.
2. Read and understand the warnings and cautions listed throughout the manual.
3. Have all of your questions been answered?
4. *Use EXTREME caution during installation and start-up.*

**SPECIFICATIONS****Drive Specifications****Ratings**

Input Power	230 vac (115 vac optional) single phase
Line Frequency	50/60 Hz
Output Current	
115 vac input (optional)	8.5 Amps at 17 kHz
230 vac input	6.0 Amps at 17 kHz
	optional 8.5 Amps at 12 kHz
Bus Voltage	
115 vac input (optional)	160 vdc
230 vac input	320 vdc
Drive Service Factor	1.0
Duty	Continuous
Reference Signal (No Potentiometer)	0 to ±10 vdc
Modulation Frequency	17 kHz or 12 kHz
Commutation Feedback	Hall Effect Sensors
Velocity Feedback	1000 ppr Encoder

**Operating Conditions**

Line Voltage Variations	±10%
Line Frequency Variation	±2 Hz
Ambient Temperature	0 to 50°C (32 to 122°F)
Altitude	to 3300' above sea level
Humidity	up to 95% non-condensing

**Length Controller Specifications**

Feedback	1000 ppr differential encoder
Isolated Power for Optos	12 vdc
Maximum Speed	1800 rpm or 4000 rpm optional
Inputs (12)	opto isolated 24 vdc
Outputs (4)	uncommitted phototransistor 50 mA max
Drive Enable Output	relay
Set-Up (serial RS232 - 2400 baud)	
PID	0 to 99%
Accel/Decel	0 to 9,999 ms
Velocity	0 to 99%
Jog Speed	0 to 99%
Position	0 to 9,999,999 counts
Output Reference to Drive	0 to ±10 vdc
Encoder Output to Drive	Ch A and Ch B single ended

**Physical Dimensions** 5.4"W × 10.0"H × 6.5"D

## INSTALLATION AND SET-UP

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Improper installation or operation of this controller may cause personal injury or damage to equipment. Please read the operating instructions. The controller, motor, and its associated control devices must be grounded in accordance with local and national electrical codes to reduce the potential for electric shock. Disconnect all power sources before initiating any repairs or maintenance. Keep fingers and foreign objects away from ventilation and drive components.

***Potentially lethal high voltages exist within the controller and connections. Use extreme caution during installation and start-up.***

Before installing the controller, check the unit for any physical damage that may have occurred during shipping.

***Do not install a damaged controller; return for repair.***

Install the controller using the mounting dimensions provided at the end of this manual. The controller should be mounted vertically with the fan on the bottom. To insure proper ventilation, leave sufficient clearance below the controller for unrestricted air flow.

Connect power to the terminals marked line and neutral. Refer to the connection diagram.

***Check the power source for the proper voltage which is stated on the controller nameplate. Improper line voltage connection to the controller may cause personal injury or damage to the controller.***

This controller has been designed for a wide variety of applications. Refer to the connection diagram as a reference. Each individual application may require a different approach. Use shielded cable for Hall Effect, encoder, I/O, and reference connections. Shielded signal wires of 22 to 18 AWG are recommended. The shield should be connected to the common terminal.

The motor wires should be connected to U, V, and W. (Refer to the connection diagram for proper motor phasing.) The motor frame and the chassis of the controller should be connected to earth ground.

**Note:** The terminals marked earth ground are internally connected to the chassis of the controller.

Verify all wiring connections. Apply power to the controller. The power on, bus voltage, and run LED's should be illuminated. If the fault LED comes on, the line voltage is either too high or too low. Disconnect the power and check the line voltage.

***Any time that power is applied and removed, allow at least one minute for the DC bus voltage to diminish (discharge) before initiating any repairs. The bus voltage LED will illuminate down to a bus voltage of approximately 25 to 50 vdc.***

## INSTALLATION AND SET-UP (cont.)

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If the controller was purchased from Intral Design with the motor as a package system, the drive section of the controller will have been tuned at the factory prior to shipment. In this case, the drive adjustments can be bypassed.

### DRIVE ADJUSTMENTS

If drive adjustments must be made, it is usually easier to connect a 5K potentiometer to terminals 14, 15, and 16 of the drive section (TB2) with the wiper connected to terminal 15. The existing wire on terminal 15 must be temporarily removed. Be sure that this wire is insulated, because a voltage will exist when the motor is moved.

**Note: When finished with the adjustments, disconnect power before reconnecting the wire to terminal 15 on the drive section.**

**Current Limit:** Adjustable from 1 Amp to 8.5 Amps for 115 vac controllers, and from 1 Amp to 6.0 Amps for 230 vac controllers. CCW = minimum current, CW = maximum current. Adjust the current setting to match load requirements without exceeding the motor nameplate rating. During acceleration or deceleration, if the current limit light comes on, unstable operation can occur. Either increase the current or program a longer accel/decel time.

**Response:** CCW = slow response, CW = fast response. If the response setting of the drive section of the controller is too slow, the motor will not follow the move profile. If the response is too fast, oscillation or instability may occur. If this adjustment must be adjusted, connect a 5K pot as a reference and, with the motor connected to the load, adjust CW until the motor slightly vibrates or oscillates, then reduce (turn CCW) until the motor stabilizes.

**Bias:** With the reference disconnected, adjust until motor reaches zero speed.

**Accel/Decel:** Adjust to full CCW (fastest accel/decel). The length controller will profile accel/decel.

**Max Speed:** With speed pot connected, adjust to 9 vdc reference and adjust max speed pot to give desired full speed (e.g. 1800 rpm).

**PROGRAMMING**

Connect a computer or laptop with an RS232 port to the controller. (Refer to the connection diagram.)

Install the supplied software on the computer or laptop, using the “Add/Remove Programs” icon in the control panels. The supplied software is Windows based and will run on Windows 95 or Windows 3.1.

A sequence program must be entered, using line numbers 01-50. Double-click on the desired command in one of the three command boxes, follow the directions in the command set-up box (if any). Then click “Add” to place that command in the program listing box.

When switched to run mode, the controller will sequence through the line numbers, executing each command in order. Program sequencing or a move can be interrupted at any time by switching back to program mode. The motor will decelerate to stop at the programmed accel/decel rate. This can be used as a stop input, although when switched back to run mode, the controller will start sequencing at the first line number.

**WARNING**

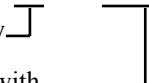
**Care should be taken when using execute move immediate or level sensitive inputs. If powered up in run mode and input enabled, motion will start automatically. All inputs should be disabled at power up.**

**Initiating a Serial Move**

When a serial command is encountered, the serial port is active and waiting for serial commands. **Serial Port Settings:** 2400 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

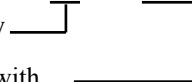
The format to execute a serial move is:

**Absolute** - V x x L x x x x x <CR>

2 digit velocity  Carriage return executes move

5 digit length with assumed 3 place decimal

**Incremental** - V x x L ± x x x x x <CR>

2 digit velocity  Carriage return executes move

5 digit length with direction and assumed 3 place decimal

**COMMAND LIST**

---

**Length Commands:**

**Absolute Length:** An absolute position move that will be executed at the next execute move command.

**Absolute Serial:** When program sequencing reaches this command, the serial port will be constantly scanned, waiting for a move to be entered. <CR> Carriage Return executes a move. See notes on how to initiate a serial move.

**Incremental Length:** Same as absolute length except direction (+/-) must be entered.

**Incremental Serial:** Same as absolute serial. See notes on how to initiate a serial move.

**Note:** After any incremental move, the counter is zeroed. If this is used in a program with absolute positioning, the absolute position zero will be altered.

**Registration Length:** The move length to be executed after recognition of the registration input. When external data is selected, the registration length and speed must be programmed from the optional operator interface, using the F1 function key.

**Note:** Only the length and speed programmed in the F1 function on the operator interface can be used as external data for a registration move.

**Preset Length:** Incremental lengths which must be downloaded from the optional operator interface. See operator interface section.

**Input/Output:**

**Turn On Output:** Turn on outputs 1-4. All outputs can be turned on for a specifically designated amount of time, then automatically turn off. Outputs 1 and 2 can be turned on and later turned off in the program sequence. When external data is selected, the amount of time must be programmed from the optional operator interface, using the F1, F2, or F3 function keys.

**Turn Off Output:** Used to turn off outputs 1 and 2.

**Execute Move:** Execute a previously programmed move length. (Can be immediate; see warning.) Programmable for inputs 1-8. Inputs 1-4 are edge triggered, while 5-8 are level sensitive. See warning about using level sensitive inputs.

**Registration Move:** Execute a previously programmed registration length, either immediate (see warning) or input 1 only. Motor will accelerate to speed, searching for registration input. Once triggered, an exact move from that point will be executed.

**Home Move:** Execute a home search (at the speed and direction determined on the tuning screen) either immediately or on an input. When home input is

triggered, the counter is set to zero and the motor decelerates to a stop. Then a precision absolute move is made to zero. If already on switch, the move will go off switch first, then continue as discussed.

**Move Speed:** Maximum speed for the next move length, The speed must be programmed prior to a move length.

**Control Commands:**

**Do Loop #1, #2, #3:** Will cause a jump to a specified line number for a specified number of times (up to 999 each). Can be used for batching, loops can be nested to expand batching capabilities. When external data is selected, the loop count must be entered from the optional operator interface, using the F1, F2, or F3 function keys. (External loop can be up to 9999.)

**Program Jump:** Will cause a program jump to a specified line number. Can be immediate or on an input. The input must be enabled when the line number is reached to cause a jump. Programmable for all inputs. All inputs are level sensitive (see warning).

**Time Delay:** Add delay to program sequencing. The controller will not sequence to the next line number until times out.

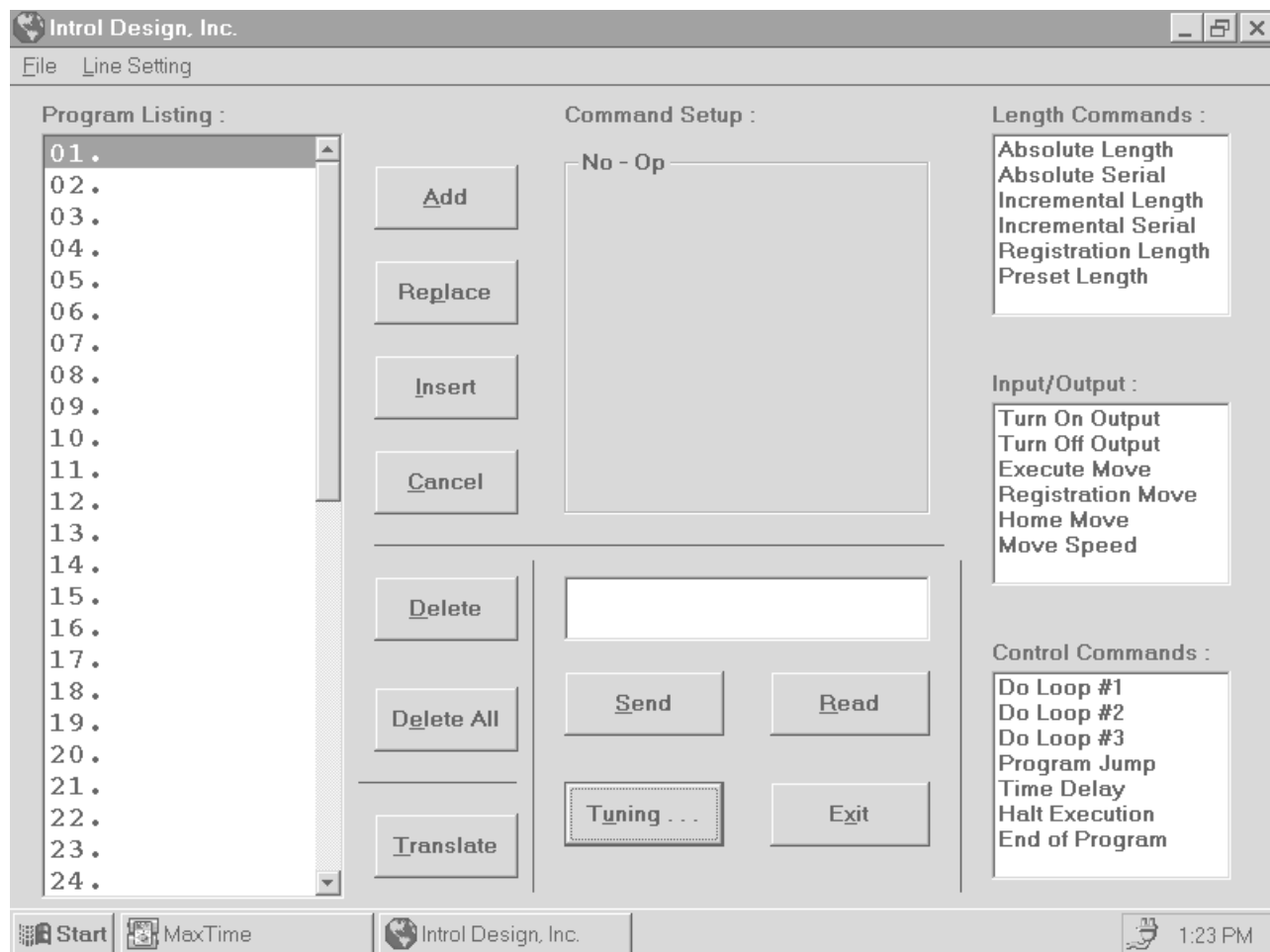
**Halt Execution:** Program sequencing is halted until specified input is enabled. Programmable for all inputs.

**End of Program:** Must be added at end of program. When entered, all following memory space is erased. Can be used as a “clear.”

## MAIN SCREEN

**File:** Click on to load or save a file to disk.

**Line Setting:** Click on to change com port.



Double-click on the desired command in one of the three command boxes. Follow the directions in the command set-up box, if any.

**SEND**

Click to download program to controller.

**READ**

Click to upload program from controller.

**TUNING**

Click to bring up tuning screen.

**EXIT**

Click to exit program.

**ADD**

Click to transfer a command in the command set-up box to the next sequenced line number.

**REPLACE**

Highlight line number to be replaced, then click to replace with command in command set-up box.

**INSERT**

Highlight line number where new command is to be inserted and click to insert command in command set-up box.

**CANCEL**

Click to cancel command in command set-up box.

**DELETE**

Highlight line number to be deleted and click.

**DELETE ALL**

Click on to delete entire program.

**TRANSLATE**

Highlight line number to be translated and click. Translation will be in command set-up box.

## TUNING SCREEN PARAMETERS

**Calibration Constant:** The number of encoder counts x4 which is equal to 1,000 programmed in any length command. For example, if an input for incremental length is entered and is desired to be equal to 1 motor revolution, the calibrator value to program would be 4000.00.

Click ▲ or ▼ under the digit to be changed.

**Accel/Decel:** (Acceleration/Deceleration) This is the accel/decel rate of the motor from zero speed to full speed (1800 rpm). For example, if the accel/decel is set at 200 ms the motor will reach 1800 rpm in 200 ms, or 900 rpm in 100 ms. Programmable from 0 to 9.99 in 10 ms increments.

Click ◀ or ▶, or drag slide bar to change.

**Jog Speed:** Jog speed of the motor, programmable from 0 to 99 (0 to 1800 rpm), enabled by either Jog Fwd or Jog Rev inputs. The jog inputs are disabled during run mode.

Click ◀ or ▶, or drag slide bar to change.

**Home Speed:** The home search speed, with search direction.

Click ◀ or ▶, or drag slide bar to change.

**P Gain:** (Proportional Gain) The difference between the reference (desired position) and the feedback (actual position) is multiplied by this calibrator and summed with I Gain and D Gain to produce an error signal. In general, a larger proportional gain will reduce following error. Programmable from 0 to 99.

Click ▲ or ▼, or drag slide bar to change.

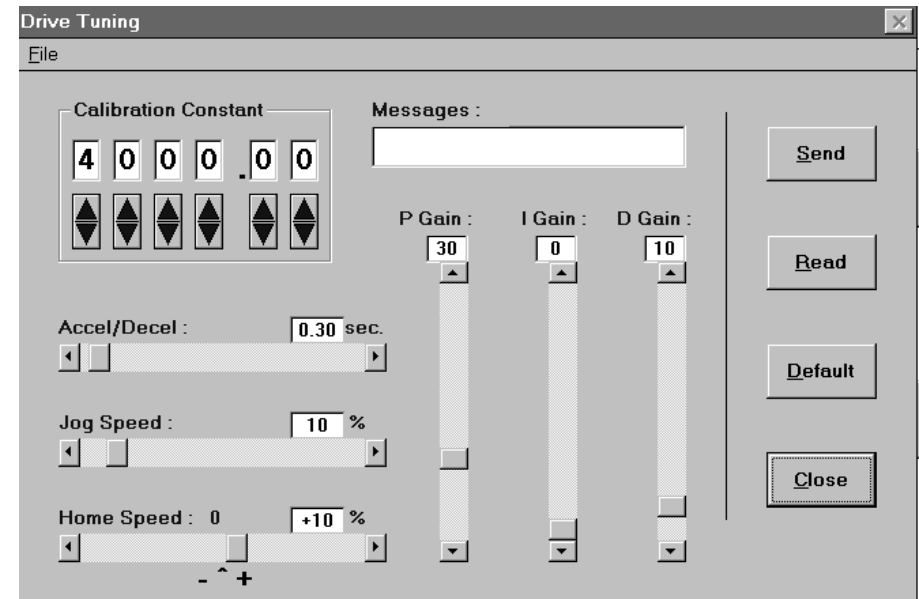
**I Gain:** (Integral Gain) The difference between the reference and the feedback is multiplied by this calibrator and accumulated to produce an integrating error. Excessive I Gain will produce system instability. In most cases, this parameter can be programmed to zero. Programmable from 0 to 99.

Click ▲ or ▼, or drag slide bar to change.

**D Gain:** (Derivative Gain) The rate of change of the difference between the reference and feedback is multiplied by this calibrator. Higher D Gain will help to prevent overshoot. Programmable from 0 to 99.

Click ▲ or ▼, or drag slide bar to change.

## TUNING SCREEN



**SEND**

Click to download new parameters to the controller.

**READ**

Click to upload parameters from the controller.

**DEFAULT**

Click to set factory parameters.

**CLOSE**

Click to return to the program screen.



**ISOLATED I/O**

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**Inputs**

IN1 - IN4: Edge triggered input used for GO, HOME, and GO REGISTRATION (#1 only) commands. Level sensitive for HALT and JUMP commands. **(See Warning.)**

IN5 - IN8: Level sensitive inputs used for GO commands, conditional jumps, HOME command and HALT commands. **(See Warning.)**

JOG FWD/JOG REV: Operational in PRG mode only. Motor will Jog at Jog Speed programmed on Tuning screen, while input is enabled.

PRG/RUN: Enable for RUN Mode, Disable for PRG Mode

PRG Mode – In PRG Mode, all parameters and sequence steps can be programmed or viewed. Jog Inputs are active also.

RUN Mode – When switched to RUN Mode, or powered up in RUN Mode, controller will start sequencing at the first programmed step. **(See Warning.)**

**Note:** A move can be interrupted at any time by switching back to Program Mode. The motor will decelerate to stop at the programmed accel/decel rate. This can be used as a stop input, although, when switched back to Run Mode, controller will start sequencing at the first line number.

HOME / REG: Home Limit Switch Input or Registration Switch Input.

**WARNING**

**Care should be taken when using execute move immediate or level sensitive inputs. If powered up in run mode and input enabled, motion will start automatically. All inputs should be disabled at power up.**

**Outputs**

OUT 1, OUT 2, OUT 3, OUT 4: Programmable outputs for ON and OFF Commands.

**NON-ISOLATED I/O**

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**Encoder Inputs:** Encoder inputs are for differential line drive encoders. They include A,  $\bar{A}$ , B,  $\bar{B}$ , Z and  $\bar{Z}$ . The input frequency should not exceed 50 kHz. Twisted pair shielded wire must be used to reduce the possibility of electrical noise at these inputs, causing incorrect positioning. (Refer to connection diagram for proper phasing.)

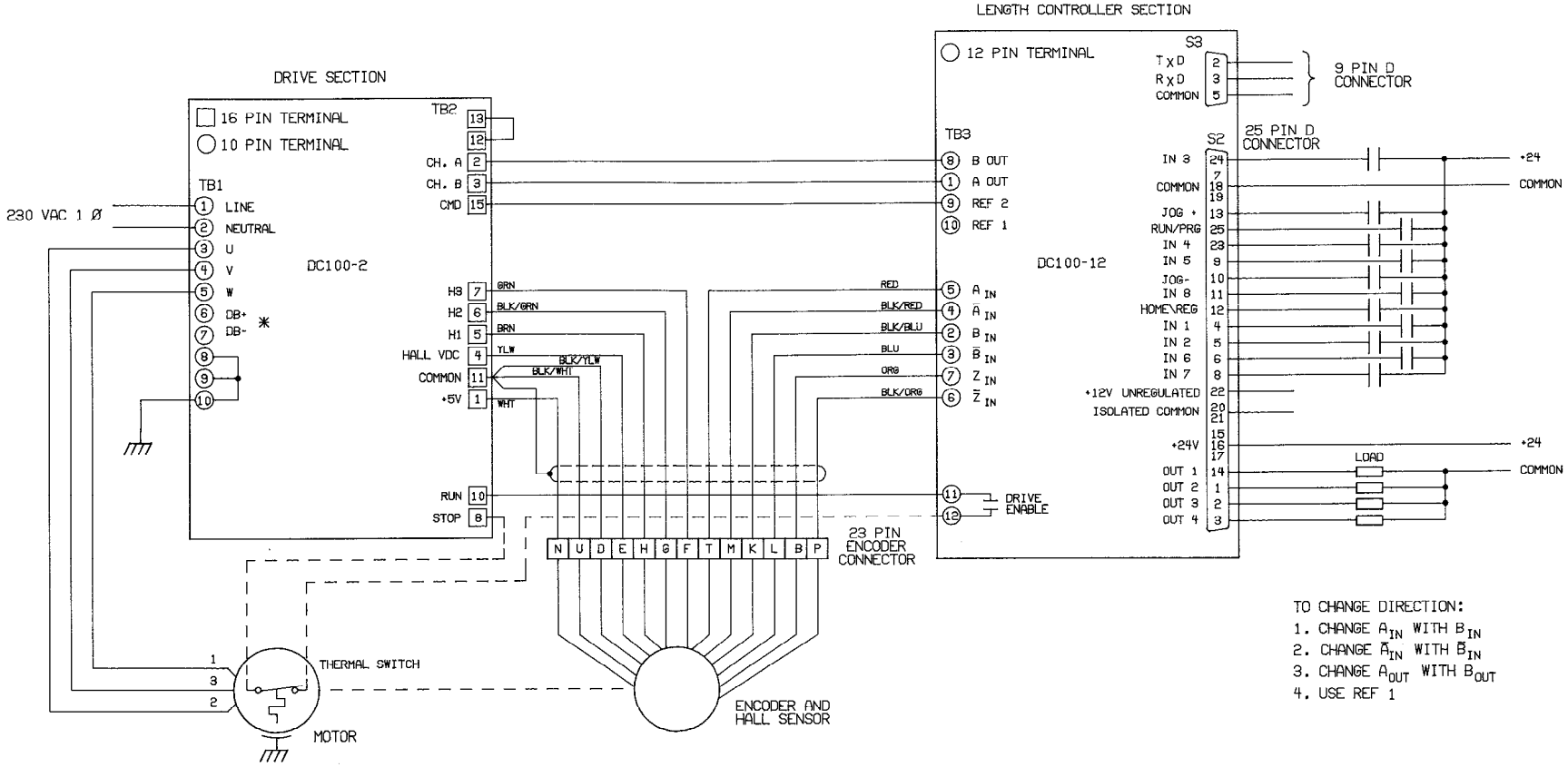
**Encoder Outputs:** Single ended encoder outputs are decoded for use with the drive section of the control for velocity feedback. These outputs connect directly to the drive section and are A and B channels. (Refer to connection diagram for proper phasing.)

**Reference Output:** This output is a 0 to  $\pm 10$  vdc analog output to the drive section for velocity and position control. (Refer to connection diagram for proper connection.)

**Drive Enable:** This output is a relay contact intended to enable the drive section. This output is enabled after the controller section has performed all initialization calculations after power-up. During a fault condition, this output is disabled. (Refer to connection diagram for proper terminal connections.)

**Serial Interface:** Standard RS232 interface. 2400 baud, 1 start bit, 8 data bits, 1 stop bit, no parity. When connecting to a communication terminal, use terminals TxD, RxD, and Common. (Refer to connection diagrams for proper terminal connections.)

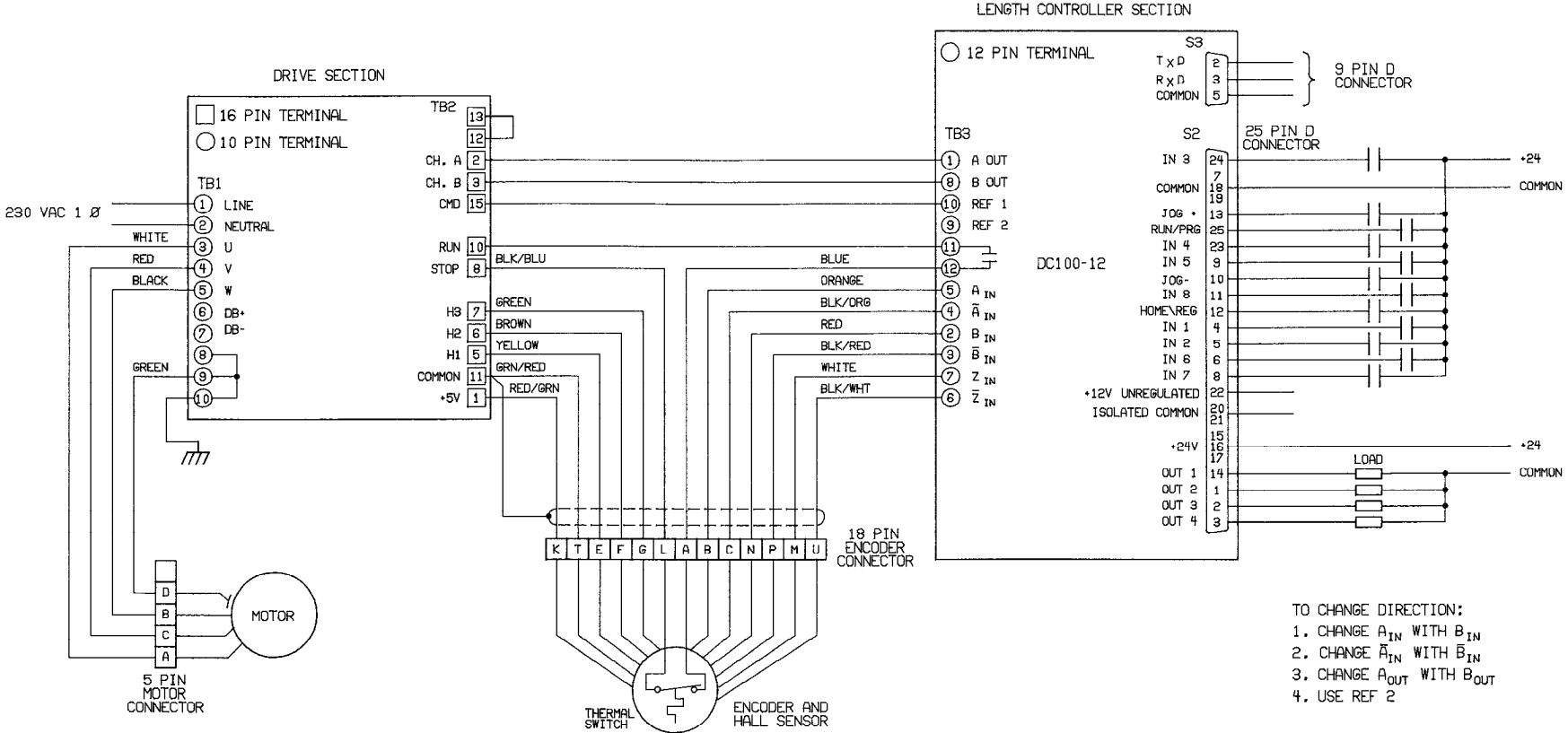
**DC100A-LCP CONNECTION DIAGRAM FOR BALDOR MOTOR**



- TO CHANGE DIRECTION:
1. CHANGE A<sub>IN</sub> WITH B<sub>IN</sub>
  2. CHANGE A<sub>IN</sub> WITH B<sub>IN</sub>
  3. CHANGE A<sub>OUT</sub> WITH B<sub>OUT</sub>
  4. USE REF 1

\* NOTE: CONNECTIONS NOT USUALLY REQUIRED FOR DB+ AND DB- INTERNALLY CONNECTED BUS DISCHARGE RESISTORS ARE SUPPLIED.

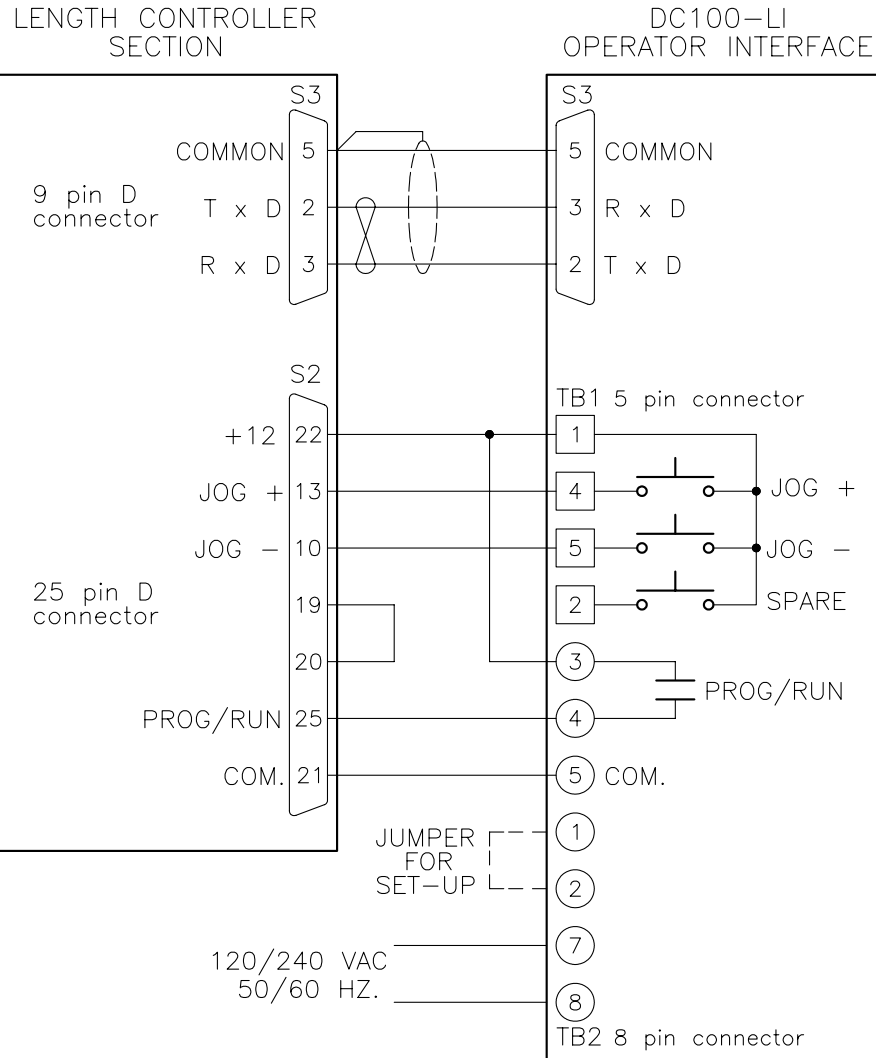
**DC100A-LCP CONNECTION DIAGRAM FOR SERVO MOTOR**



- TO CHANGE DIRECTION:
1. CHANGE A<sub>IN</sub> WITH B<sub>IN</sub>
  2. CHANGE A<sub>IN</sub> WITH B<sub>IN</sub>
  3. CHANGE A<sub>OUT</sub> WITH B<sub>OUT</sub>
  4. USE REF 2

**DC100A-LCP CONNECTION DIAGRAM FOR OPERATOR INTERFACE**

**TROUBLESHOOTING**



NOTE: To change input voltage, disconnect power & remove cover. Make connections as follows:  
 120 VAC: D to E, B to A  
 240 VAC: D to C, B to C

Control appears to be dead, **power on** LED not illuminated, fan not working.

- No AC power is applied.
- Blown line fuse.
- Loose connections.

**Fault** LED on when power is applied.

- Line voltage too high.
- Line voltage too low.
- DC bus fuse blown. Refer to fuse location diagram.

**Current limit** LED on when in run mode.

- Current limit setting too low.
- Motor overloaded.

When starting the drive, the **fault** LED comes on.

- Shorted power block.
- Shorted motor.
- Shorted motor wires.
- Short to ground.

Line fuses blow or main circuit breaker trips when applying power.

- AC input shorted.
- Damaged (shorted) rectifier bridge.
- Input AC voltage exceeds the control rating.

Motor runs away.

- No encoder connection.
- Encoder phasing incorrect.
- Reference incorrect.

Line fuses blow when start is energized.

- Shorted power block.

Motor appears sluggish.

- Response setting too slow.
- Current limit setting too low.

Drive appears to be functioning normally, but there is no power to the motor.

- DC bus fuse is blown. Refer to fuse location diagram.
- Power driver power supply circuitry is defective.

Drive runs fine, but trips out and **fault** LED comes on when slowing down.

- Bus discharge fuse blown. Refer to fuse location diagram.
- Defective bus discharge transistor.
- Defective energy absorption resistor.

Motor buzzing or chattering while at or near zero speed.

- Response setting too fast.
- Noisy reference input. Make sure to use shielded cable with the shield connected to the common terminal.

Oscillation or instability.

- Response on drive too fast.
- Gains too high, especially I Gain.
- Inertia mismatch too great.

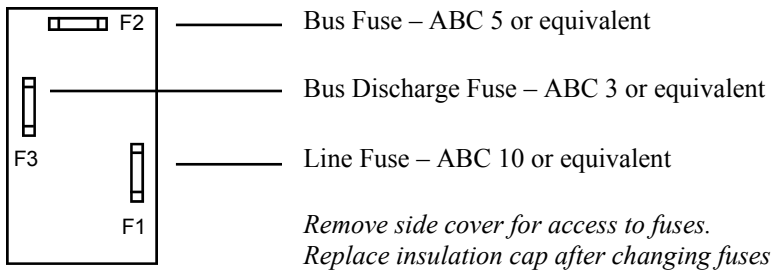
**FAULT CONDITIONS**

**Drive Fault:** The fault LED will be on and the drive disabled if an overvoltage, undervoltage, or overcurrent condition exists. The drive will not automatically reset when the fault is cleared. To reset the drive, disconnect power and reapply.

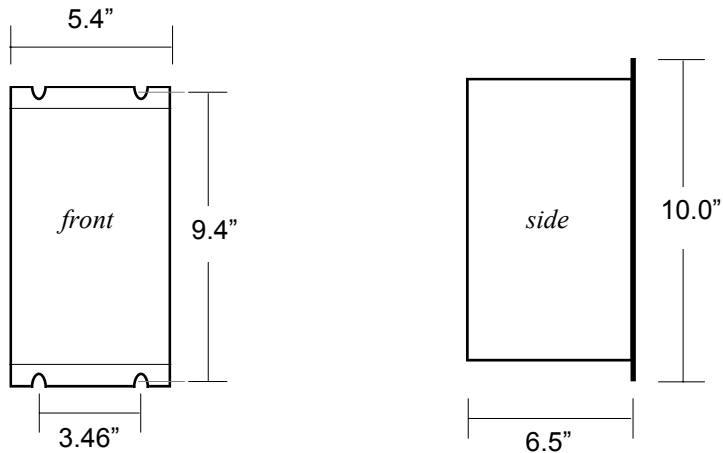
**Position Controller Fault:** The Position Controller will disable the drive if there is a severe lag error or cannot pull into position. This can be determined by visually observing the drive section Run LED. The Position Controller will not automatically reset. To reset, disconnect power and reapply.

*Any time the power is applied and removed, allow at least one minute for the DC bus voltage to diminish (discharge) before initiating any repairs. The bus voltage LED will illuminate down to a bus voltage of approximately 25-50 vdc.*

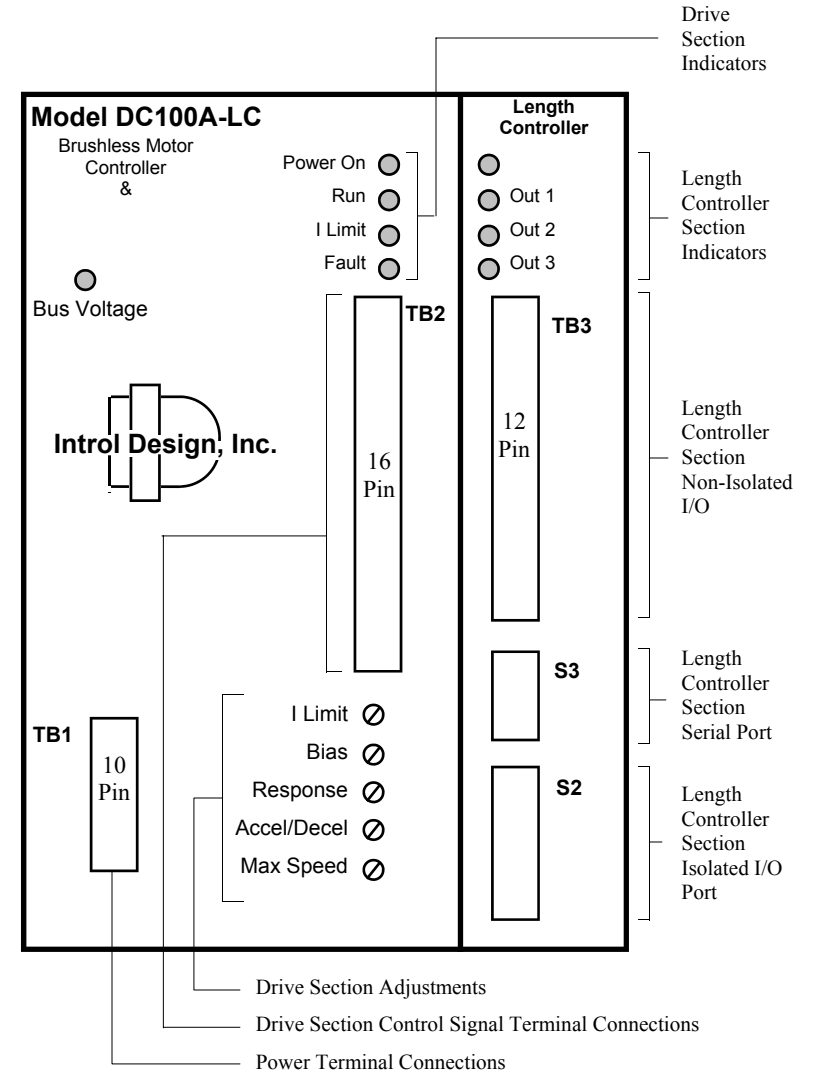
**FUSE LOCATIONS**



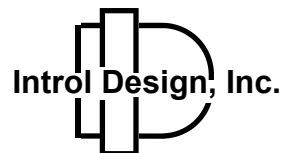
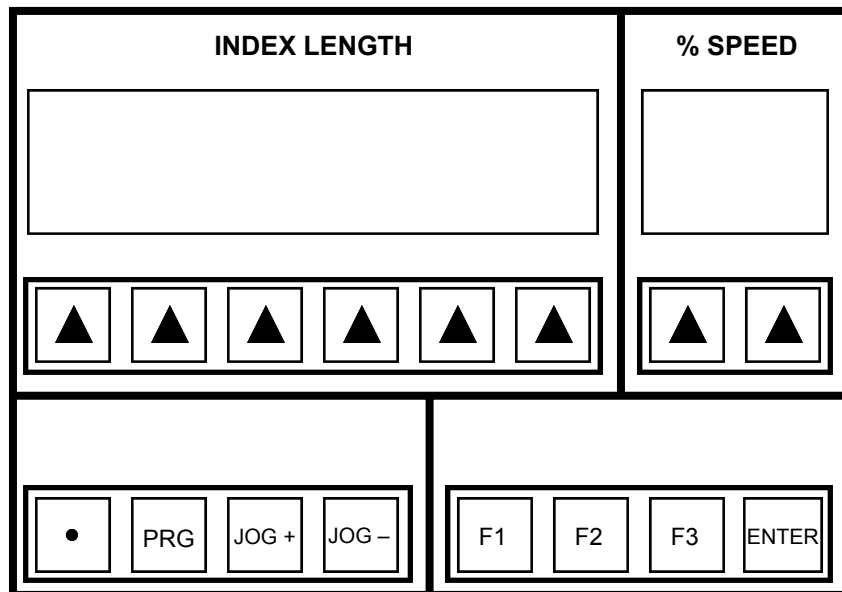
**MOUNTING DIMENSIONS**



**TERMINAL, INDICATOR, AND ADJUSTMENT LOCATIONS**



## OPTIONAL INTROL OPERATOR INTERFACE



The operator interface is designed to be an easy to use interface to program the speed and length capabilities of the DC100A-LCP position controller. The interface functions similar to a thumbwheel switch. Each press of the ▲ key under a digit increases its value by one. When the value reaches 9, the next key press will cause the digit to rollover to zero. The function keys (F1, F2, and F3) can be toggled On/Off. The LED will be illuminated when that function is active. Function keys allow sending more than one preset length and speed. Pressing the Enter key will transmit data to the positioner in the drive. The positioner must have L1, L2, L3, or L4, or any of the function key parameters, programmed in the sequence programming. When that line number is reached, the length and speed, or specified functions, are loaded and executed.

## OPTIONAL INTROL OPERATOR INTERFACE (cont.)

### Length Keys

The key to the far left in the index length window determines direction. Toggle it for <blank> (positive direction) or “-” (negative direction). The negative (-) direction can be disabled by set-up parameter P4. The maximum length which can be programmed is 99.999. A calibrator is provided in the positioner in the drive to allow programming in inches or any other engineering unit.

### Speed Keys

The maximum speed which can be programmed is 99%.

### Function Keys

Function is active when LED is on. Toggle On/Off.

#### No F Key Enabled

When the ENTER key is pressed, L1 (Length One) and V1 (Velocity One) are transmitted to the positioner in the drive.

**F1** F1 Key Enabled (Toggled ON, LED Illuminated)  
When the ENTER key is pressed, L2 (Length Two) and V2 (Velocity Two) or Jog Speed, Loop Counter, or Timer are transmitted to the positioner in the drive, depending on set-up parameter P1.

**F2** F2 Key Enabled (Toggled ON, LED Illuminated)  
When the ENTER key is pressed, L3 (Length Three) and V3 (Velocity Three) or Jog Speed, Loop Counter, or Timer are transmitted to the positioner in the drive, depending on set-up parameter P2.

**F3** F3 Key Enabled (Toggled ON, LED Illuminated)  
When the ENTER key is pressed, L4 (Length Four) and V4 (Velocity Four) or Jog Speed, Loop Counter, or Timer are transmitted to the positioner in the drive, depending on set-up parameter P3.

**Note:** The values for L1, L2, L3, L4, and V1, V2, V3, V4 and Jog Speed, Loop Counter, and Timer are stored in non-volatile memory. When toggling from one to another, the previously programmed value for that function is displayed. To change, simply press ▲ under the desired digit and press ENTER.

#### Enter Key

**ENTER**  
When pressed, the value indicated on the display is transmitted to the positioner in the drive. Also, the values are stored in non-volatile memory. The codes are sent depending on the state of the function keys.

**OPTIONAL INTRLOL OPERATOR INTERFACE (cont.)**

---

**Enter Key** (cont.)

**Note:** Software in the positioner in the drive can be configured to use one or all of the L1, L2, L3, L4, and V1, V2, V3, V4 lengths and speeds, or combinations of loop counters and timers. The interface is a convenient way to enter these values. Also, the positioner in the drive must be in program mode (manual mode) to accept length and speed data. If the positioner in the drive does not accept the new settings, the interface display will display ( - ) and revert back to the previous setting.



**Auxiliary Key**

A spare normally open contact; can be used as an input to the controller.



**Program Key**

Press On/Off to enter run mode or program mode. In run mode, the Enter LED is on at all times and all Function and ▲ keys are disabled. When the Enter LED is off, the interface and controller are in program mode and all functions are active. The Program key can be enabled or disabled with parameter P0.



**Jog +**

Active in program mode only. Causes the controller to jog in the ( + ) direction at the programmed jog speed.



**Jog -**

Active in program mode only. Causes the controller to jog in the ( - ) direction at the programmed jog speed.

**Set-Up Procedure**

Jumper the set-up terminals on the interface. (Refer to connection diagram.) In the set-up mode, the least significant digit of the % **Speed** setting selects the parameter, and the **Index Length** switches select the value. With the set-up terminals jumpered, the most significant digit of the % **Speed** will display P. Any time the **Enter** button is pressed, the **enter** LED will be on.

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**OPTIONAL INTROL OPERATOR INTERFACE (cont.)**


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**Programming Examples****Run/Program Key**

- 01 - Enable
- 02 - Disable

P	0					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

**F1 Key Function**

- 01 - L2 (Length Two) and V2 (Velocity Two)
- 02 - Jog Speed
- 03 - Loop Counter
- 04 - Timer

P	1					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

**F2 Key Function**

- 01 - L3 (Length Three) and V3 (Velocity Three)
- 02 - Jog Speed
- 03 - Loop Counter
- 04 - Timer

P	2					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

**F3 Key Function**

- 01 - L4 (Length Four) and V4 (Velocity Four)
- 02 - Jog Speed
- 03 - Loop Counter
- 04 - Timer

P	3					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

**Enable/Disable Direction Key**

- 01 - Enable
- 02 - Disable

(See Direction parameter P5)

P	4					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

**Programming Examples****Direction**

- 01 - + Direction
- 02 - - Direction

P	5					0	1
---	---	--	--	--	--	---	---

Press **Enter** button to enter.

When the direction parameter is set to disable direction change by the operator (P4 = 02), the direction can be set by this

**Offset L1**

No Function Key

P	6		0	0	0	0	0
---	---	--	---	---	---	---	---

Press **Enter** button to enter.

**Offset L2**

F1 Key

P	7		0	0	0	0	0
---	---	--	---	---	---	---	---

Press **Enter** button to enter.

**Offset L3**

F2 Key

P	8		-	0	0	0	0
---	---	--	---	---	---	---	---

Press **Enter** button to enter.

**Offset L4**

F3 Key

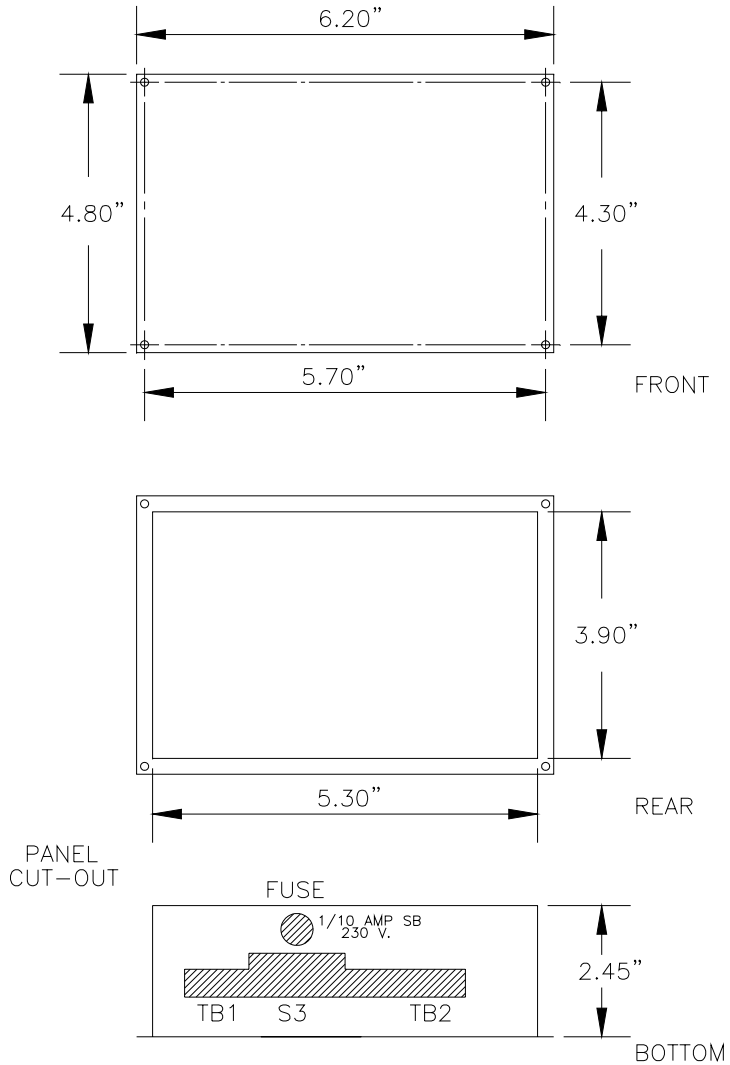
P	9		-	0	0	0	0
---	---	--	---	---	---	---	---

Press **Enter** button to enter.

**Note:** Offsets can be added or subtracted from L1 – L4. Toggle the far left key blank to add, or to (-) to subtract. If no offset is required, set to 00.000. When the offset value is changed, the length (L1 – L4) must be entered again for the new length to be transmitted to the positioner.



**INTROL OPERATOR INTERFACE MOUNTING DIMENSIONS**



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