

# SL-15

Adjustable Speed Control  
for Bodine Shunt Wound  
1/70 and 1/50 HP  
115 VDC Motors



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## Safety Warnings



**Note:** This symbol  denotes an important safety message. Please read these sections carefully before performing any instructions contained in this manual.

- Have a qualified electrical maintenance technician install, adjust and service this equipment. Follow the National Electrical Code and all other applicable electrical and safety codes, including the provisions of the Occupational Safety and Health Act (OSHA), when installing equipment.
- Reduce the chance of an electrical fire, shock, or explosion by proper grounding, over current protection, thermal protection, and enclosure. Follow sound maintenance procedures.

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## General Information

The Model SL15 Minarik adjustable speed control is a full wave, solid state device that is designed to control and vary the speed of Bodine 1/70th and 1/50th HP, 115 VDC shunt wound motors. The control has choke/capacitor filtering to assure the controlled motor will be extra quiet, smooth, and cool running. In a typical application 2% base speed regulation is provided with the help of temperature, line voltage and IR compensation. The control features a Forward-Brake-Reverse rotary switch and a dual speed range of 25:1 and 35:1. It also has adjustable IR compensation and maximum speed adjustment to limit high speed operation. The Model SL15 Minarik adjustable speed control is a UL (Underwriters Laboratories) recognized component, File E35603.

## Features

- Forward-Brake-Reverse Rotary Switch
- Dual Speed Range
- Choke/Capacitor Filtering
- Temperature Compensation
- 2% Base Speed Regulation (Typical Application)
- Maximum Speed Adjustment
- Adjustable IR Compensation
- Line Starting and Stopping
- Line Voltage Compensation
- Full Wave Armature and Field Supply

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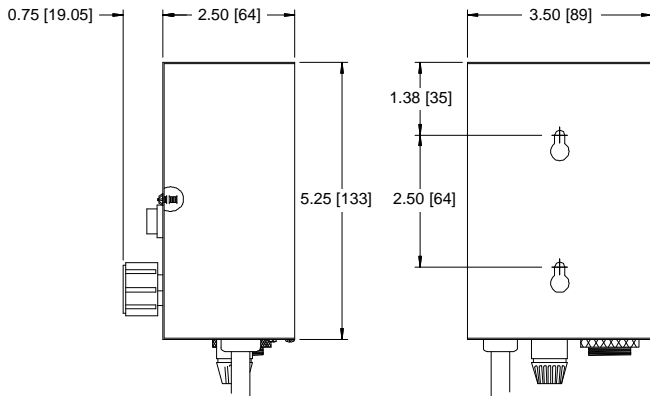
## Specifications

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|                           |                                |
|---------------------------|--------------------------------|
| Input Voltage             | 115 VAC, 50/60 Hz Single Phase |
| Maximum Input current     | 0.9 Amperes                    |
| Output Armature Voltage   | 0 - 115 VDC                    |
| Output Armature Current   | 0.25 Amperes                   |
| Output Field Voltage      | 100 VDC                        |
| Output Field Current      | 0.2 Amperes                    |
| Weight                    | 1.75 Pounds                    |
| Ambient Temperature Range | 10° thru 40° Centigrade        |

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## Dimensional Data



**Figure 1. SL15 Mounting Dimensions**



## Installation

The SL15 is housed in a NEMA 1 enclosure and has a line cord with plug and motor socket at the end of the case. The unit may be vertically wall mounted or horizontally bench mounted utilizing the two keyholes on the back of the case (refer to Figure 1 on page 4). The unit may also be operated without mounting.

1. Attach the motor cable plug to the control's motor socket, being careful to key the ridge on the plug into the slot on the socket.
2. Set the POWER switch to the OFF position.
3. Plug the line cord into a properly grounded 3-wire electrical outlet of the same voltage as listed on the control nameplate.

## Operating Instructions

1. Turn the FWD-BRAKE-REV (Forward-Brake-Reverse) switch to the BRAKE position.
2. Set the speed adjust knob to "0" (full CCW).
3. Set the POWER switch to the LO or HI range position and leave it on continuously. The maximum torque is obtained in the LO speed range only.
4. Place the FWD-BRAKE-REV switch in either FWD or REV position and turn the speed knob CW to the desired speed. FWD gives CW rotation when facing the output shaft with motors cabled by Minarik.
5. Motor may be started and stopped at any speed setting with the FWD-BRAKE-REV switch. When placed in the BRAKE position the motor is dynamically braked to a stop.

## Calibration



### Warning

Dangerous voltages exist on the printed circuit board. Contact with components and/or printed circuitry could cause serious injury or fatality. Please refer to and follow the Safety Warnings on page i. **IMPORTANT:** A non-metallic screwdriver should be used when adjusting the trimpots to avoid any possibility of the screwdriver's blade contacting live circuitry and shorting the circuitry or allowing contact with any dangerous fatal voltages.

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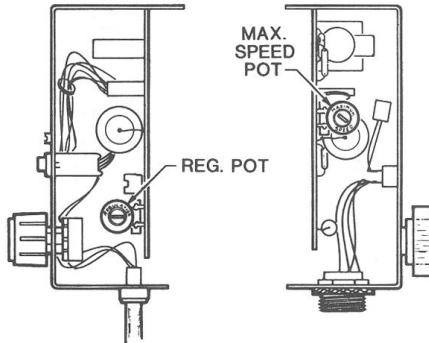
## Standard Calibration

The control has been factory calibrated and no further adjustments should be necessary. However, if the control has been repaired or the user wants to make any changes the below listed procedures should be followed.

1. With the line voltage disconnected, unscrew the two screws on the front panel and the center bottom screws on each end of the control.
2. Remove the rear cover by grasping the sides and carefully pulling it straight off.
3. Set the POWER switch to the OFF position.
4. Turn the FWD-BRAKE-REV switch to the BRAKE position.
5. Set the speed adjust to "0" (full CCW).
6. Set the MAXIMUM SPEED trimpot to full CCW (refer to Figure 3, page 11).
7. Set the REGULATION trimpot to full CCW (refer to Figure 3, page 11).

8. Attach the motor cable plug to the control's motor socket, being careful to key the ridge on the plug into the slot on the socket.
9. Heed and follow the SAFETY WARNING at the beginning of this section (page 8).
10. With no load on the motor, apply 115 VAC to the control and slide the control POWER switch to the LO position.
11. Set the FWD-BRAKE-REV switch to either FWD or REV position and advance the speed adjust knob to "100" (full CW).
12. Adjust the MAXIMUM SPEED trimpot for approximately 2500 RPM motor speed at no load.
13. Set the speed adjust knob for approximately 700 RPM at no load. Adjust the REGULATION trimpot to obtain 700 RPM at full load.
14. Set the speed adjust knob to "100" (full CW) and readjust the MAXIMUM SPEED trimpot to approximately 2500 RPM no load.

15. Set power switch to OFF.
16. Disconnect the line voltage from the control.
17. Carefully replace the rear cover.
18. Replace the 2 screws on the front panel and the center bottom screws on each end of the control.



**Figure 3. Maximum Speed and Regulation Trim Pot Locations**

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## Parts List

| REFERENCE | PART NUMBER | DESCRIPTION                     |
|-----------|-------------|---------------------------------|
| C1        | 010-0020    | 0.02 MFD 500 VOLT               |
| C2        | 010-0034    | 0.15 MFD 100 VOLT               |
| C3        | 011-0015    | 50 MFD 6 VDC                    |
| C4        | 011-0018    | 50 MFD 350 VDC                  |
| C5        | 010-0032    | 0.1 MFD 500 VOLT                |
| D1        | 071-0012    | 1 AMP 600 VDC SILICON DIODE     |
| D2 - D5   | 071-0007    | 3 AMP 600VDC SILICON DIODE      |
| DAS       | 075-0002    | TRANSIENT SUPPRESSOR            |
| FU        | 050-0026    | 1-1/2 AMP 3 AG NORMAL BLOW FUSE |
| NLT       | 040-0003    | NEON PILOT LAMP                 |
| P1        | 120-0006    | 6K OHM 5 WATT POT               |
| P2        | 121-0020    | 20K OHM 1/4 WATT POT            |
| P3        | 121-0002    | 100 OHM 1/4 WATT POT            |
| PL1       | 164-0056    | 11 TERMINAL CONNECTOR (FEMALE)  |
| PL2       | 164-0004    | 4 PIN MOTOR CABLE PLUG          |
| Q1        | 070-0009    | D5E44 OR 2N2646                 |
| Q2        | 070-0010    | 2N3638 OR 2N5354                |

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| REFERENCE | PART NUMBER | DESCRIPTION                 |
|-----------|-------------|-----------------------------|
| Q3        | 070-0011    | 2N2923                      |
| R1        | 031-0033    | 1K OHM 1/2 WATT             |
| R2        | 032-0005    | 22K OHM 1 WATT              |
| R3        | 031-0029    | 470 OHM 1/2 WATT            |
| R4        | 032-0003    | 10K OHM 1 WATT 10%          |
| R5-R7     | 031-0040    | 5.6K OHM 1/2 WATT           |
| R8 - R9   | 031-0047    | 33K OHM 1/2 WATT            |
| R10-R11   | 031-0032    | 820 OHM 1/2 WATT            |
| R12       | 031-0043    | 15K OHM 1/2 WATT            |
| R13       | 031-0012    | 47OHM 1/2 WATT              |
| R14       | 032-0018    | 3 OHM 5 WATT                |
| R15       | 032-0026    | 1K OHM 5 WATT               |
| S01       | 164-0054    | 9 TERMINAL CONNECTOR (MALE) |
| S02       | 164-0003    | 4 PIN MOTOR SOCKET          |
| SCR       | 072-0014    | 8 AMP 400 VOLT SCR          |
| SW1       | 081-0002    | DP 3 POSITION ROTARY SWITCH |
| SW2       | 085-0004    | 3 POSITION SLIDE SWITCH     |

| <b>REFERENCE</b> | <b>PART NUMBER</b> | <b>DESCRIPTION</b>              |
|------------------|--------------------|---------------------------------|
| TH               | 033-0002           | 3K OHM THERMISTOR               |
| X1               | 240-0003           | MINARIK CHOKE                   |
| Z1               | 071-0002           | 1N4747 ZENER DIODE              |
|                  | 200-0033-15        | COMPLETE CAL. PC BOARD ASSEMBLY |

## Troubleshooting

Before proceeding check the following:

1. Be sure the line cord is plugged into a wall outlet of the same voltage that is listed on the control nameplate.
2. See that the plug on the motor cable is correctly keyed into the motor socket on the control.
3. Check to see that the line fuse is of the same value as shown on the control nameplate.

**Warning**

Dangerous voltages exist on the printed circuit board. Contact with components and/or printed circuitry could cause serious injury or fatality. Please refer to and follow the Safety Warnings on page i. **IMPORTANT:** A non-metallic screwdriver should be used when adjusting the trimpots to avoid any possibility of the screwdriver's blade contacting live circuitry and shorting the circuitry or allowing contact with any dangerous fatal voltages.

- I.
  - Set the speed control pot, P1, to zero on the dial.
  - Place the FWD-BRAKE-REV switch in the BRAKE position.
  - Place the POWER switch SW2 to LO range.
  
- A. If the pilot light NLT on the panel does not turn on, check:
  1. Line fuse (FU)
  2. AC voltage at the wall outlet.
  3. AC voltage on both sides of the power switch (SW2).

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- II. If the line fuse (FU) blows, place the POWER switch in the OFF position. Unplug the line cord from the wall outlet and check:
- A. Plug on the motor cable may not be correctly keyed into the control's motor socket.
  - B. Pilot light, NLT, may be shorted.
  - C. Transient suppressor, DAS, may be shorted.
  - D. One or more of the diodes (D2, D3, D4, or D5) may be shorted.
    1. Disconnect the motor from the control socket.
    2. Resistance should read high in on direction and low in the opposite direction across each of the diodes.
  - E. Motor cable or motor field may be shorted or grounded. A resistance reading on the motor cable plug between pins 3 and 4 should read approximately 1190 ohms.

- III.
  - Connect the motor cable to the control.
  - Plug the line cord into the wall outlet.
  - Set the FWD-BRAKE-REV switch to either the FWD or REV position.
  - Set the POWER switch to LO range.
  - Advance the speed adjust knob to the maximum setting on the dial.
  
- A. If the fuse (FU) continues to blow:
  - 1. The motor may be overloaded. Place the FWD-BRAKE-REV switch in BRAKE position and disconnect the load from the motor. Place the direction switch in the FWD or REV position. The motor should run at full speed without blowing the fuse.
  
  - 2. The motor armature or motor cable may be shorted or grounded. Disconnect the motor cable. An ohmmeter reading between pins 1 and 2 on the motor cable plug

should read approximately 118 ohms. A reading from either pin to the motor frame should show open (use high ohm scale).

3. Motor field circuit may be open. An ohmmeter reading between pins 3 and 4 on the motor cable plug should read approximately 1190 ohms.
  4. Filter capacitor (C4) may be shorted.
  5. High armature current due to a weak field may cause a diode to be open (D2, D3, D4, or D5) resulting in a blown fuse at no load or very light load.
  6. Diode (D1) may be shorted.
- B. If the fuse does not blow, but the motor will not run:
1. The speed control potentiometer (P1) may be open.

2. The rectifier (SCR) may be defective.
  3. The transistor (Q1, Q2, or Q3) may be defective.
  4. The filter choke (X1) may be open.
  5. The zener diode (Z1) may be shorted.
- IV. If the motor runs at high speed regardless of the speed control potentiometer setting:
- A. The rectifier (SCR) may be shorted.
  - B. The transistor (Q2 or Q3) may be shorted.

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## NOTES

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## NOTES

## Unconditional Warranty

### A. Warranty

Minarik Corporation (referred to as "the Corporation") warrants that its products will be free from defects in workmanship and material for twelve (12) months or 3,000 hours, whichever comes first, from date of manufacture thereof. Within this warranty period, the Corporation will repair or replace, at its sole discretion, such products that are returned to Minarik Corporation, 901 East Thompson Avenue, Glendale, CA 91201-2011 USA.

This warranty applies only to standard catalog products, and does not apply to specials. Any returns for special controls will be evaluated on a case-by-case basis. The Corporation is not responsible for removal, installation, or any other incidental expenses incurred in shipping the product to and from the repair point.

### B. Disclaimer

The provisions of Paragraph A are the Corporation's sole obligation and exclude all other warranties of merchantability for use, express or implied. The Corporation further disclaims any responsibility whatsoever to the customer or to any other person for injury to the person or damage or loss of property of value caused by any product that has been subject to misuse, negligence, or accident, or misapplied or modified by unauthorized persons or improperly installed.

### C. Limitations of Liability

In the event of any claim for breach of any of the Corporation's obligations, whether express or implied, and particularly of any other claim or breach of warranty contained in Paragraph A, or of any other warranties, express or implied, or claim of liability that might, despite Paragraph B, be decided against the Corporation by lawful authority, the Corporation shall under no circumstances be liable for any consequential damages, losses, or expense arising in connection with the use of, or inability to use, the Corporation's product for any purpose whatsoever.

An adjustment made under warranty does not void the warranty, nor does it imply an extension of the original 12-month warranty period. Products serviced and/or parts replaced on a no-charge basis during the warranty period carry the unexpired portion of the original warranty only.

If for any reason any of the foregoing provisions shall be ineffective, the Corporation's liability for damages arising out of its manufacture or sale of equipment, or use thereof, whether such liability is based on warranty, contract, negligence, strict liability in tort, or otherwise, shall not in any event exceed the full purchase price of such equipment.

Any action against the Corporation based upon any liability or obligation arising hereunder or under any law applicable to the sale of equipment or the use thereof, must be commenced within one year after the cause of such action arises.



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