SCU-001
Solenoid Control Unit

IMPORTANT—the SOL+ output is internally over current protected and "MAY" turn OFF without warning. Always test before use to determine that an over current condition does NOT exist!

Notice:

It is the responsibility of the purchaser to follow all guidelines and safety procedures supplied with this product and any other manufactures product used with the SCU-001. It is also the responsibility of the purchaser to determine compatibility of the SCU-001 with the vehicle and other components.

NLR, LLC assumes no responsibility for damages resulting from accident, improper installation, misuse, abuse, improper operation, lack of reasonable care, or all previously stated reasons due to incompatibility with other manufacturer's products.

NLR, LLC assumes no responsibility or liability for damages incurred from the use of products manufactured or sold by NLR, LLC on vehicles used for competition racing.

NLR, LLC neither recommends nor approves the use of products manufactured or sold by Next Level Racing, Inc. on vehicles which may be driven on public highways or roads, and assumes no responsibility for damages incurred from such use.

NLR, LLC does not recommend nor condone the use of its products for illegal street racing.

Installation of NLR, LLC products signifies that you have read this document and agree to the terms stated within.

Important Information:

Follow all recommended safety guidelines from this and other manufactures installation guides.

Static suppression ignition wires must be used with this unit! Mount the unit as far away from secondary ignition components(coil, ignition wires, etc.) as physically possible.

Description

The SCU-001 controller provides an adjustable frequency, duty cycle, and ramp time to control air, nitrous/co2 and/or fluid flow/pressure (hydraulics).

The adjustable features of this unit make it very unique as it provides a multi programmable platform for controlling a solenoid to serve whatever purpose you desire. Unlike ecu's and solenoid controllers with limited capability the SCU-001 unit offers a multi dimensional capability not available anywhere else. The SCU-001 has several control configurations to choose from. These are outlined in the following sections.

The output provides +12V to operate the solenoid. This output is rated at 30 amps maximum. It should be taken into account that this rating is NOT for continuous operation. If the SCU-001 is driving a high amperage load it should be for short durations. The output is internally over current & over temperature protected.

The various modes of operation are selected by entering a "Programming" mode, setting the dials to the desired mode of operation and completing the programming cycle. The procedure to perform this is outlined in the following sections.

The setting dials can be adjusted at any time, however the "New" settings will only be applied when the "Start" input is activated and/or the controller is powered up. When the controller is programmed to one of the "Reset" modes the control ramp will be applied on power up and the ramp will repeat anytime the "Start" input is activated. Please refer to Mode of Operation Overview for more information.

Table of Contents
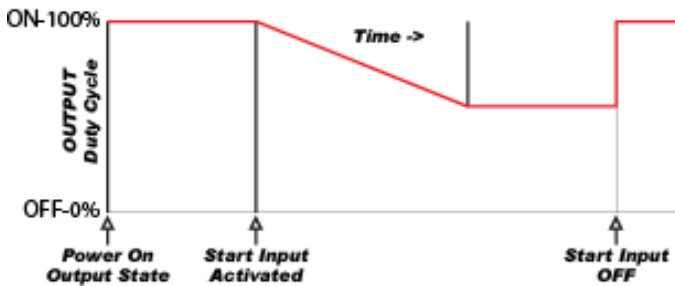
Mode of Operation Overview

A—Variable Frequency (On to Off)
      2—15Hz to 30Hz
      3—27Hz to 42Hz

On power up the output will be "On" and the ramp is used to partially turn off the solenoid.

In this mode Dial1 selects a starting frequency and Dial2 selects a preset ramp. Turning the Dials up will make the ramp more aggressive. If one of the preset ramps does not work you will need to select a custom mode and configure as required.

B—Variable Frequency (Off to On)
      2—15Hz to 30Hz
      3—27Hz to 42Hz

On power up the output will be "Off" and the ramp is used to partially turn on the solenoid.

In this mode Dial1 selects a starting frequency and Dial2 selects a preset ramp. Turning the Dials up will make the ramp more aggressive. If one of the preset ramps does not work you will need to select a custom mode and configure as required.
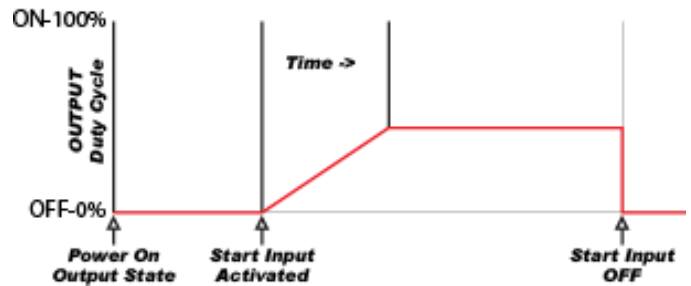
All other modes of operation use a common secondary configuration.

      1—15Hz, .10 Second Base Time Period
      2—15Hz, .25 Second Base Time Period
      3—15Hz, .50 Second Base Time Period
      4—15Hz, 1.0 Second Base Time Period
      5—20Hz, .10 Second Base Time Period
      6—20Hz, .25 Second Base Time Period
      7—20Hz, .50 Second Base Time Period
      8—20Hz, 1.0 Second Base Time Period
      9—25Hz, .10 Second Base Time Period
    10—25Hz, .25 Second Base Time Period
    11—25Hz, .50 Second Base Time Period
    12—25Hz, 1.0 Second Base Time Period
    13—30Hz, .10 Second Base Time Period
    14—30Hz, .25 Second Base Time Period
    15—30Hz, .50 Second Base Time Period
    16—30Hz, 1.0 Second Base Time Period

The primary configuration setting (A, B, C, etc…) determines the operating mode. This controls power on output state and the basic ramp function.

The secondary configuration sets the operating frequency and base time period.

Both the primary and secondary configuration values can be programmed using a special sequence.

When operating in mode C to J "Dial1" sets the target duty cycle percentage and "Dial2" sets the ramp time multiplier. The total ramp time is calculated using the "Base Time Period" times the "Dial2" setting.
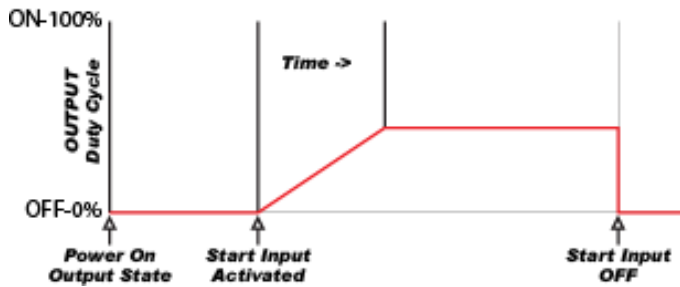
Example—.10 second base time period and Dial2 set on 5 = .5 second control ramp time.

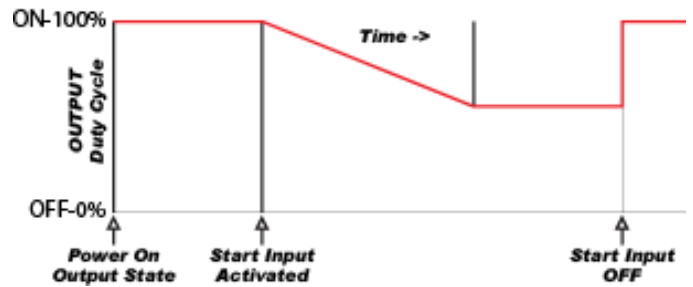**C**—Ramp Control Percentage Hold (Off to %)
   See Page 4 for secondary settings.

On power up the output will be "Off" and the output will ramp to the percentage setting on "Dial1". The Base Time Period and "Dial2" will determine the ramp rate/time.

ON-100%

OUTPUT Duty Cycle

Time ->

OFF-0%

Power On Output State   **Start Input Activated**   **Start Input OFF**

D—Ramp Control Percentage Hold (On to %)
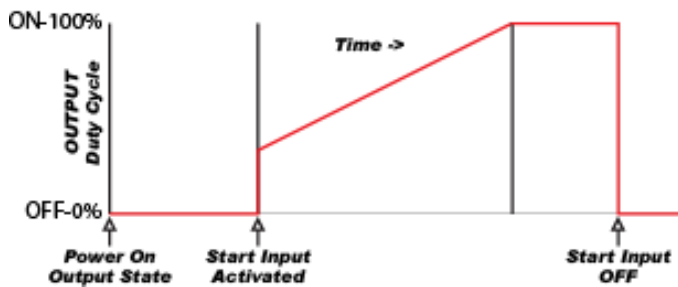   See Page 4 for secondary settings.

On power up the output will be "On" and the output will ramp to the percentage setting on "Dial1". The Base Time Period and "Dial2" will determine the ramp rate/time.

ON-100%

OUTPUT Duty Cycle

Time ->

OFF-0%

Power On Output State   **Start Input Activated**   **Start Input OFF**

E—Ramp Control (% to On)
   See Page 4 for secondary settings.

On power up the output will be "Off" and the output will ramp to full On from the percentage setting on "Dial1". The Base Time Period and "Dial2" will determine the ramp rate/time.

ON-100%

OUTPUT Duty Cycle

Time ->

OFF-0%

Power On Output State   **Start Input Activated**   **Start Input OFF**

F—Ramp Control (% to Off)
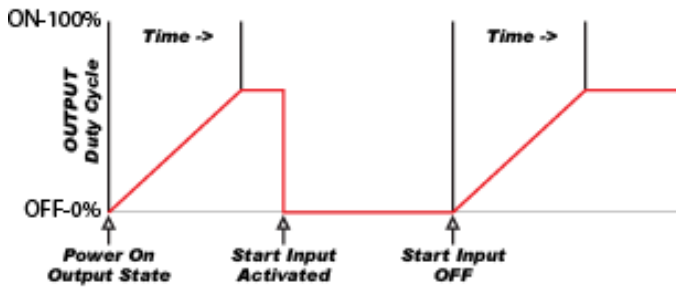   See Page 4 for secondary settings.

On power up the output will be "Off" and the output will ramp to full Off from the percentage setting on "Dial1". The Base Time Period and "Dial2" will determine the ramp rate/time.

ON-100%

OUTPUT Duty Cycle

Time ->

OFF-0%

**Power On Output State**   **Start Input Activated**   **Start Input OFF**

5

G—Ramp Control Percentage Hold (Off to %) (Reset)
See Page 4 for secondary settings.

On power up the output will automatically apply the control ramp. When the "Start" input is activated the output will turn off and the control ramp will be reset. When the "Start" input is released the control ramp will run again.
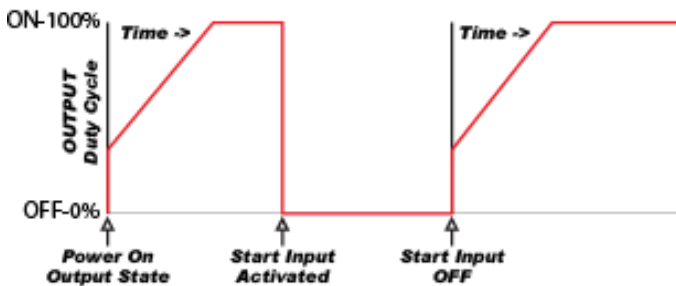

H—Ramp Control Percentage Hold (On to %) (Reset)
See Page 4 for secondary settings.

On power up the output will automatically apply the control ramp. When the "Start" input is activated the output will turn off and the control ramp will be reset. When the "Start" input is released the control ramp will run again.
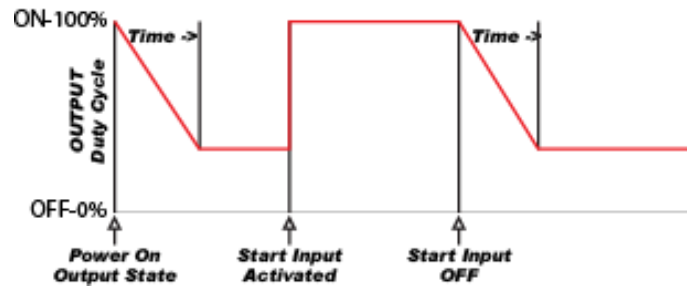
I—Ramp Control (% to On) (Reset)
See Page 4 for secondary settings.

On power up the output will automatically apply the control ramp. When the "Start" input is activated the output will turn off and the control ramp will be reset. When the "Start" input is released the control ramp will run again.

J—Ramp Control (% to Off) (Reset)
See Page 4 for secondary settings.

On power up the output will automatically apply the control ramp. When the "Start" input is activated the output will turn off and the control ramp will be reset. When the "Start" input is released the control ramp will run again.
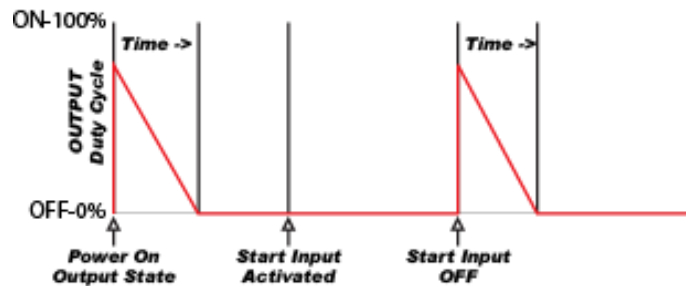

6

Determining Current Mode of Operation

The programmed mode of operation can be checked by setting Dial1 to "B" and Dial2 to "2" and powering up the controller with the "Start" input activated. At this time the LED will blink green indicating the current "Mode of Operation" that is programmed into the controller. The LED will then blink red to indicate the "Range" if Mode A or Mode B is selected or "Base Time Period" for the control ramp in all other modes of operation. By counting the number of times the LED blinks the current setting is determined.

The controller will wait for the "Start" input to be released before continuing with normal operation.

Programming Mode of Operation

The mode of operation can be programmed by following the proper sequence. Please refer to "Mode of Operation Overview" to determine the desired settings.

Step 1—With the controller OFF set Dial1 to "A" and Dial2 to "1", activate the "Start" input, and then turn power "ON" the LED will blink Red to indicate start of programming sequence.

Step 2—set Dial1 and Dial2 to the desired settings.

Step 3—release and re-activate the "Start" input.

Step 4—If the programming sequence is successful the LED will blink Green. If the LED is blinking Red/Green an error occurred during the programming process and the sequence must be started again. Trying to enter a combination of switch settings that is not supported will force an error.

Step 5—Restart the controller with the "Start" input released (OFF).

Important—if Dial1 and Dial2 are set to check mode of operation or to enter programming the "Start" input should NOT be activated on power up if normal operation is desired. With ALL other settings the "Start" input can be activated on power up if desired.

Frequency and Duty Cycle Charts

Modes A & B with secondary setting 2 (15Hz to 30Hz)

Dial1 = Start Frequency	Dial2 = Start and End duty cycle %
A—30hZ	1—95% to 90%, slow ramp
B—29hZ	2—95% to 88%, slow ramp
C—28hZ	3—95% to 86%, slow ramp
D—27hZ	4—94% to 82%, mild ramp
E—26hZ	5—94% to 80%, mild ramp
F—25hZ	6—94% to 78%, mild ramp
G—24hZ	7—93% to 76%, fast ramp
H—23hZ	8—93% to 74%, fast ramp
I—22hZ	9—93% to 72%, fast ramp
J—21hZ	10—92% to 70%, aggressive ramp
K—20hZ	11—92% to 68%, aggressive ramp
L—19hZ	12—92% to 66%, aggressive ramp
M—18hZ	13—90% to 64%, aggressive ramp
N—17hZ	14—88% to 62%, aggressive ramp
O—16hZ	15—86% to 60%, aggressive ramp
P—15hZ	16—85% to 50%, aggressive ramp

Modes A & B with secondary setting 3 (27Hz to 42Hz)

Dial1 = Start Frequency	Dial2 = Start and End duty cycle %
A—42hZ	1—5% to 10%, slow ramp
B—41hZ	2—5% to 12%, slow ramp
C—40hZ	3—5% to 14%, slow ramp
D—39hZ	4—6% to 18%, mild ramp
E—38hZ	5—6% to 20%, mild ramp
F—37hZ	6—6% to 22%, mild ramp
G—36hZ	7—7% to 24%, fast ramp
H—35hZ	8—7% to 26%, fast ramp
I—34hZ	9—7% to 28%, fast ramp
J—33hZ	10—8% to 30%, aggressive ramp
K—32hZ	11—8% to 32%, aggressive ramp
L—31hZ	12—8% to 34%, aggressive ramp
M—30hZ	13—10% to 36%, aggressive ramp
N—29hZ	14—12% to 38%, aggressive ramp
O—28hZ	15—14% to 40%, aggressive ramp
P—27hZ	16—15% to 50%, aggressive ramp

In all other modes Dial1 determines the Start or End duty cycle percentage depending on current mode of operation. Dial2 is the multiplier for the ramp control time. Please refer to "Mode of Operation Overview" and "Example Setup and Operation" for more information.

| Dial 1	Dial 2
A—25%	1—Base Time multiplied by 1
B—30%	2—Base Time multiplied by 2
C—35%	3—Base Time multiplied by 3
D—40%	4—Base Time multiplied by 4
E—45%	5—Base Time multiplied by 5
F—50%	6—Base Time multiplied by 6
G—55%	7—Base Time multiplied by 7
H—60%	8—Base Time multiplied by 8
I—65%	9—Base Time multiplied by 9
J—70%	10—Base Time multiplied by 10
K—75%	11—Base Time multiplied by 11
L—80%	12—Base Time multiplied by 12
M—85%	13—Base Time multiplied by 13
N—90%	14—Base Time multiplied by 14
O—95%	15—Base Time multiplied by 15
P—100%	16—Base Time multiplied by 16

Example Setup and Operation

This example is using Mode of Operation "C", secondary Base Time setting of "1", Dial1 set at 50%, and Dial2 set at "5".

The control ramp will start at 0% or OFF and ramp up to a 50% duty cycle over .5 seconds. The ramp time is determined by the programmed secondary setting (see page 4) which in this case is .1 second, this base time setting is multiplied by the Dial2 setting "5" which equals .5 second total ramp time.

Ramp Time = Base Time Period * Dial2 Setting = .1 second * 5 = .5 second
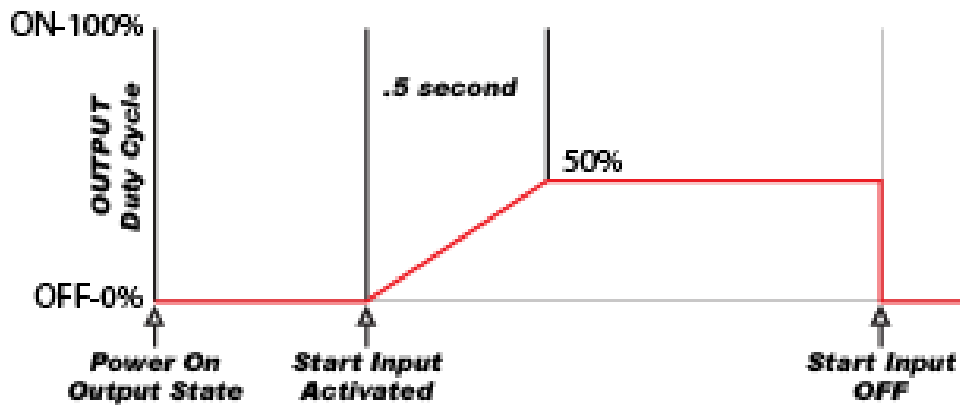
Example Wiring Diagram
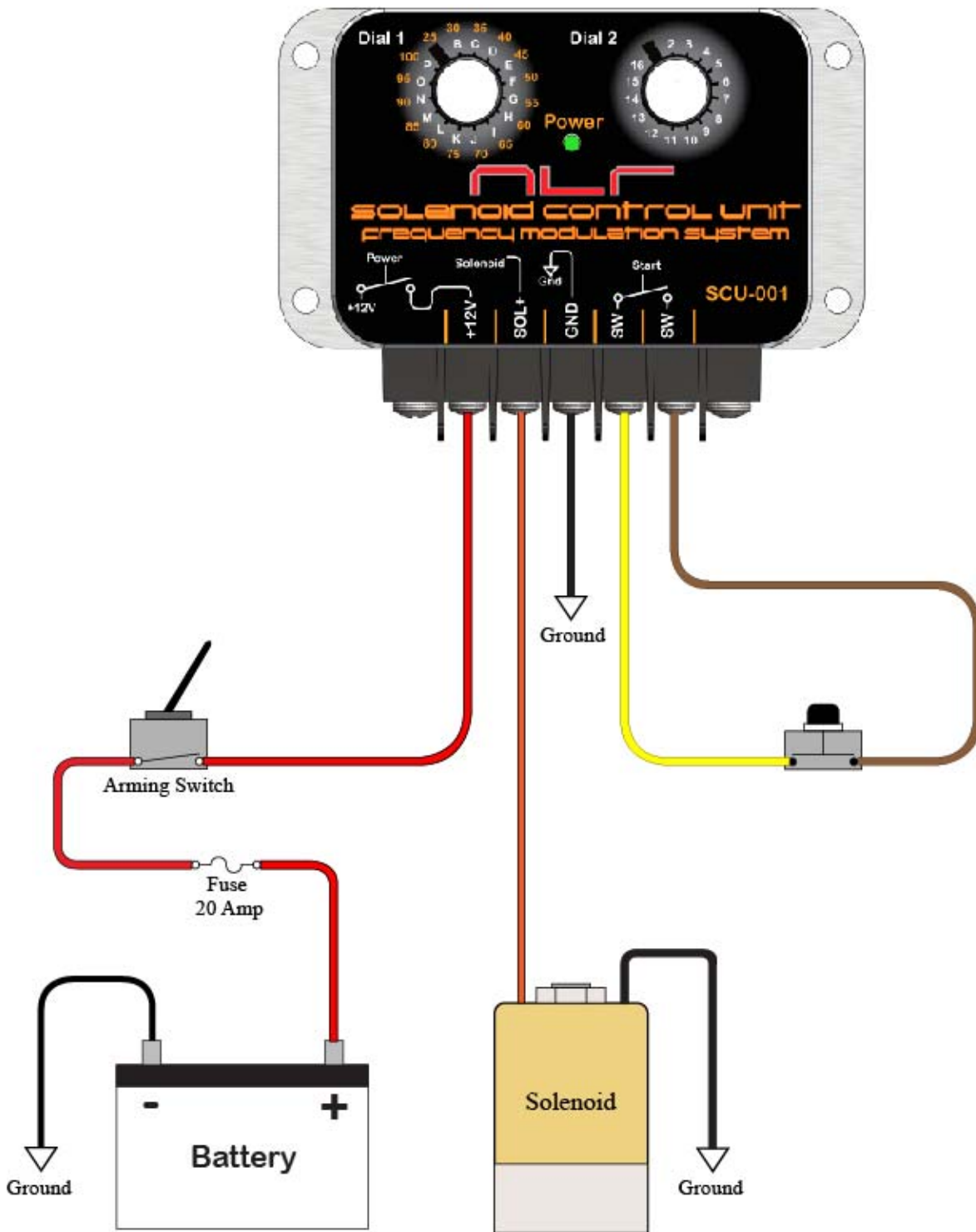
IMPORTANT—the SOL+ output is internally over current protected and MAY turn OFF without warning. Always test before use to determine that an over current condition does NOT exist!

Warranty

NLR, LLC warrants to the original purchaser that the SCU-001 controller shall be free from defects in parts and workmanship under normal use for 6 months from the date of purchase.

NLR, LLC obligation under this warranty is limited to the repair or replacement of any component found to be defective when returned postpaid to NLR, LLC.

The controller must be returned with evidence of place and date of purchase or warranty will be void. The warranty will not apply if the SCU-001 controller has been installed incorrectly, repaired, damaged, or tampered with by misuse, negligence or accident.