# SOLVES-IT! TACHOMETER APPLICATION MODULE

Revision 0 for Software Version 1.0.0.0


**PLC on a Chip Patent 7,299,099**

**A larger format of this manual may be found at http://www.divelbiss.com**

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2008012.0

# TABLE OF CONTENTS



## WARNING!

The SI-APPMOD-TACHOMETER, as with programmable controllers, must not be used alone in applications which would be hazardous to personnel in the event of failure of this device. Precautions must be taken by the user to provide mechanical and/or electrical safeguards external to this device. This device is NOT APPROVED for domestic or human medical use.

## *PACKAGE CONTENTS*

### *Whats Included*

| Qty | Description | Part Number | Location |
|---|---|---|---|
| 1 | SI-200 with Software Pre-loaded | SI-200 | In Box |
| 1 | SI-APPMOD-TACHOMETER Manual | 2008012.X | In Box |
| 1 | Din-rail Socket | 115-105328 | In Box |
| 4 | Commutating Diodes | 111-101012 | In Box |



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# GETTING STARTED

This section explains how to read this manual and understand the symbols.

## *HOW TO USE THIS MANUAL*

In this manual, the following conventions are used to distinguish elements of text:

| | |
|---|---|
| **BOLD** | Denotes labeling, commands, and literal portions of syntax that must appear exactly as shown. |
| *italic* | Used for variables and placeholders that represent the type of text to be entered by the user. |
| **SMALL CAPS** | Used to show key sequences or actual buttons, such as OK, where the user clicks the OK button. |

In addition, the following symbols appear periodically in the left margin to call the readers attention to specific details in the text:

Warns the reader of a potential danger or hazard that is associated with certain actions.

Appears when the text contains a tip that is especially helpful.

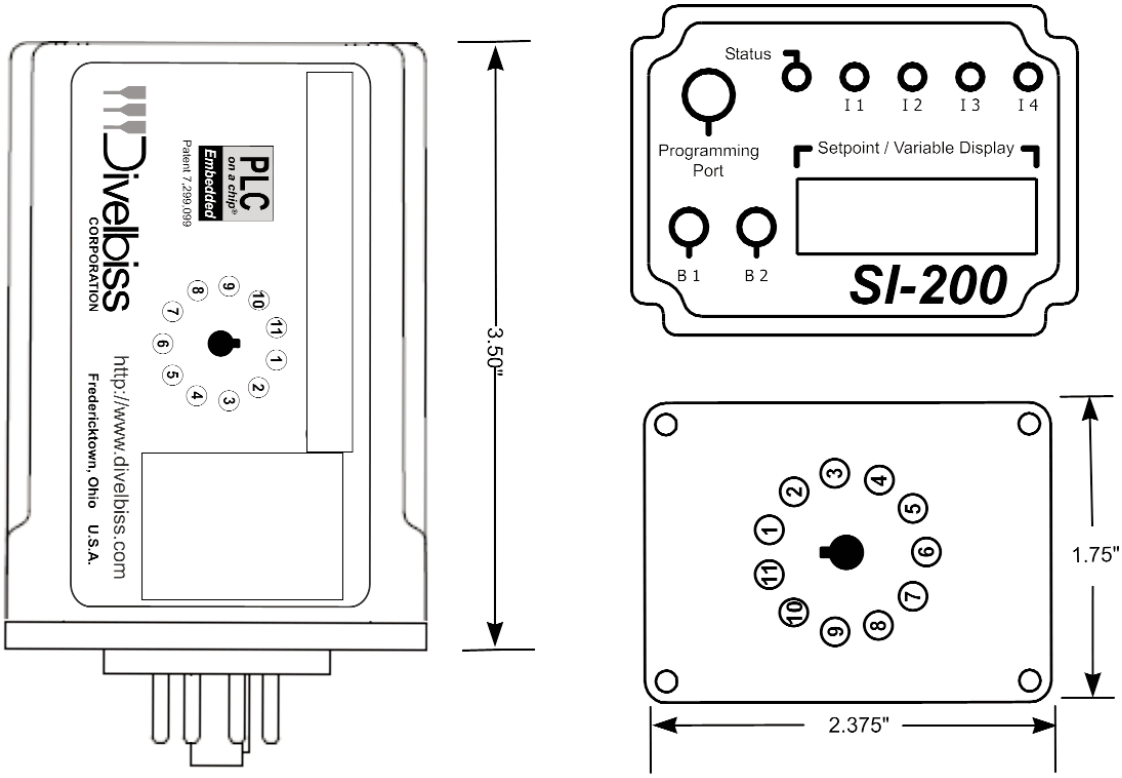
Indicates that the text contains information to which the reader should pay particularly close attention.

**All Information and Specifications Subject to Change without Notice**

# MODULE BASICS

This section describes the SI-APPMOD-Tachometer Application Module including input/output assignments and an operational description.

## *GETTING TO KNOW THE MODULE*




The module is connected to external devices via its included mounting socket.

## Connector Pin out

**Bottom View (Solves-It! Connector)**

| | |
|---|---|
| Pin 1 | Setpoint 2 Output |
| Pin 2 | Setpoint 1 Output |
| Pin 3 | Tachometer Pulse Input |
| Pin 4 | Input 1 - Not Used |
| Pin 5 | Input 2 - Not Used |
| Pin 6 | Input 3 - Not Used |
| Pin 7 | Earth Gnd |
| Pin 8 | Input Power Common |
| Pin 9 | 10-24.5VDC Input Power |
| Pin 10 | Setpoint 4 Output |
| Pin 11 | Setpoint 3 Output |

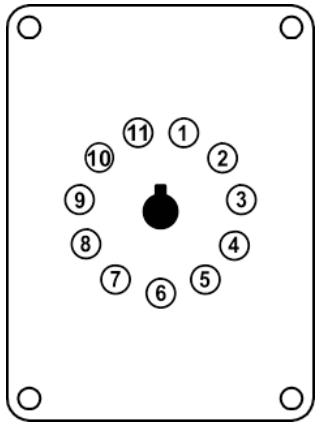


**Figure 2.1 - Module Pin-Out**

## MODULE MOUNTING

The Module mounts to an industry standard 11-pin Octal relay socket. To mount the module, align with the socket and firmly push into position.

## MODULE INPUT POWER

The module can be powered with 10-24.5VDC. The input power must be of sufficient supply to drive the module and the outputs (based on the load currents for each) Maximum current for the module is 150mADC and maximum load for each outputs is 300mADC. For the pre-programmed software, 4 outputs are used and may be on at a time. Exceeding a total output load of greater than 1ADC (more than 3 outputs at full load simultaneously) can damage the module.

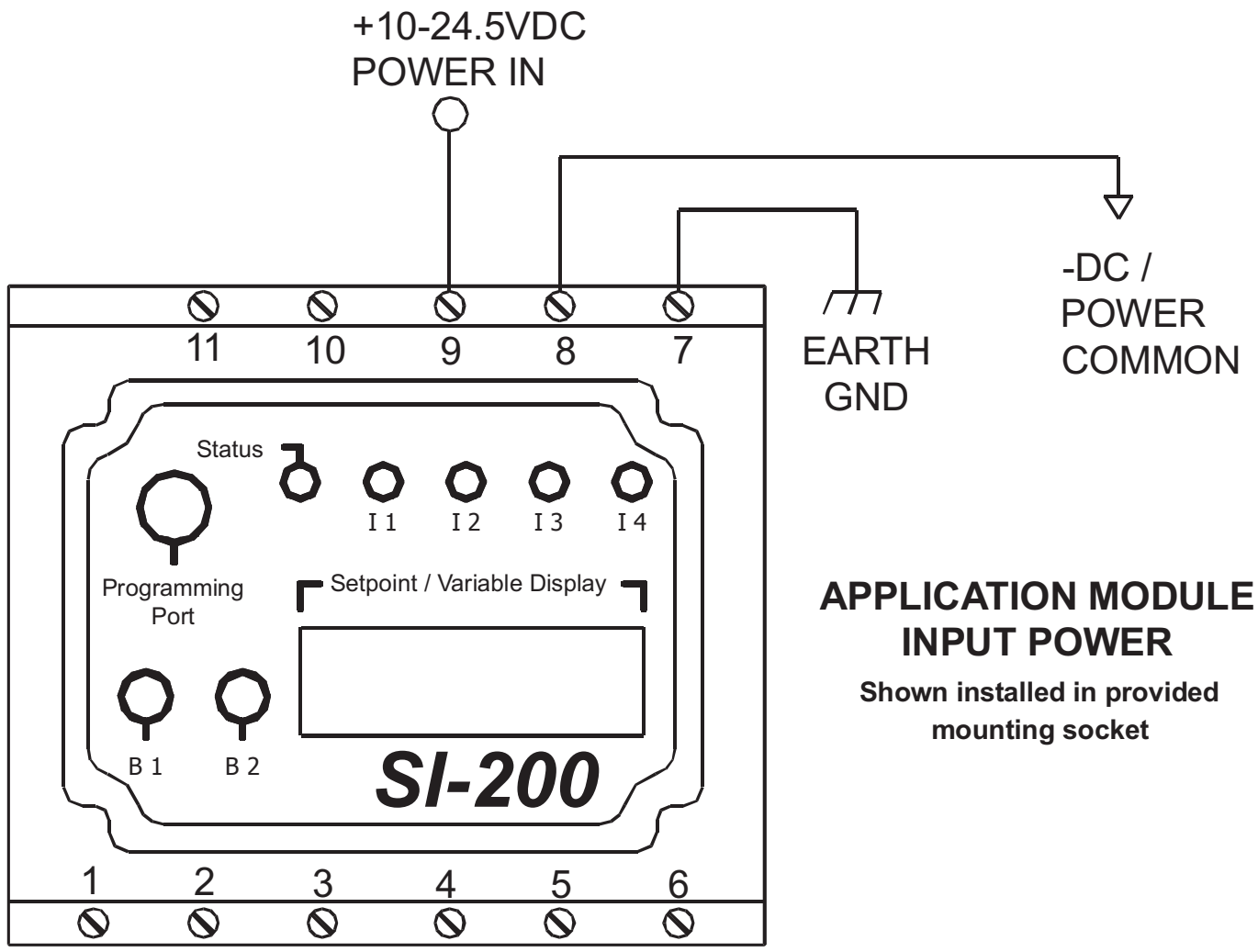



Figure 2.2 - Module Input Power Diagram

## MODULE OPERATION

The SI-APPMOD-Tachometer counts pulses on the Tachometer Pulse Input based on time and calculates RPM. This calculation is based on a 60 tooth wheel or gear.

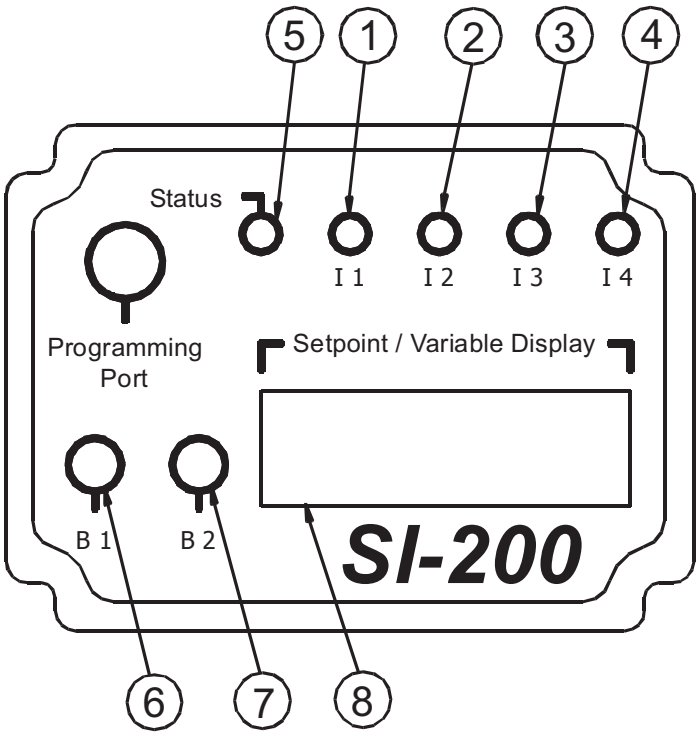
The update rate (time over which pulses are counted) is 1 second. Four output channels are provided with programmable setpoints. When the RPM is equal to or greater than a channel's setpoint, the output will energized.

## USER INTERFACE

The user interface consists of two push-buttons; labeled B1 and B2, the Setpoint/Variable Display, four LED indicators (I1-I4) and the Status LED indicator.

### 1. Indicator 1

**On-Steady indicates the Setpoint 1 value is displayed on the Setpoint / Variable Display. When flashing, the setpoint is being edited.**




### 2. Indicator 2

**On-Steady indicates the Setpoint 2 value is displayed on the Setpoint / Variable Display. When flashing, the setpoint is being edited.**

### 3. Indicator 3

**On-Steady indicates the Setpoint 3 value is displayed on the Setpoint / Variable Display. When flashing, the setpoint is being edited.**

### 4. Indicator 4

**On-Steady indicates the Setpoint 4 value is displayed on the Setpoint / Variable Display. When flashing, the setpoint is being edited.**

### 5. Module Status Indicator

**Flashing slowly indicates module problem**
**Flashing quickly indicated module is operating .**

### 6. B1 Push-button

**Each press will cycle one-step through the module setup menu. The menu # is displayed by the I1-I4 indicators.**

1. **Setpoint 1**
2. **Setpoint 2**
3. **Setpoint 3**
4. **Setpoint 4**

### 7. B2 Push-button

**For each Setpoint displayed, pressing the B1 will increment the setpoint by one (1). Holding the B2 button will cause the setpoint to increase by tens, hundreds and thousands the longer it is held pressed. The setpoint wraps to zero after 9999.**

### 8. Setpoint / Variable Display

**View and change the current setpoints.**

**Figure 2.3 - User Interface**

## PULSE INPUT CONNECTION

The Tachometer Pulse Input is sourcing; therefore requiring a sinking device be connected. When the input is connected to common (shorted to common), the input is energized. Figure 2.4 provides a sample connection.

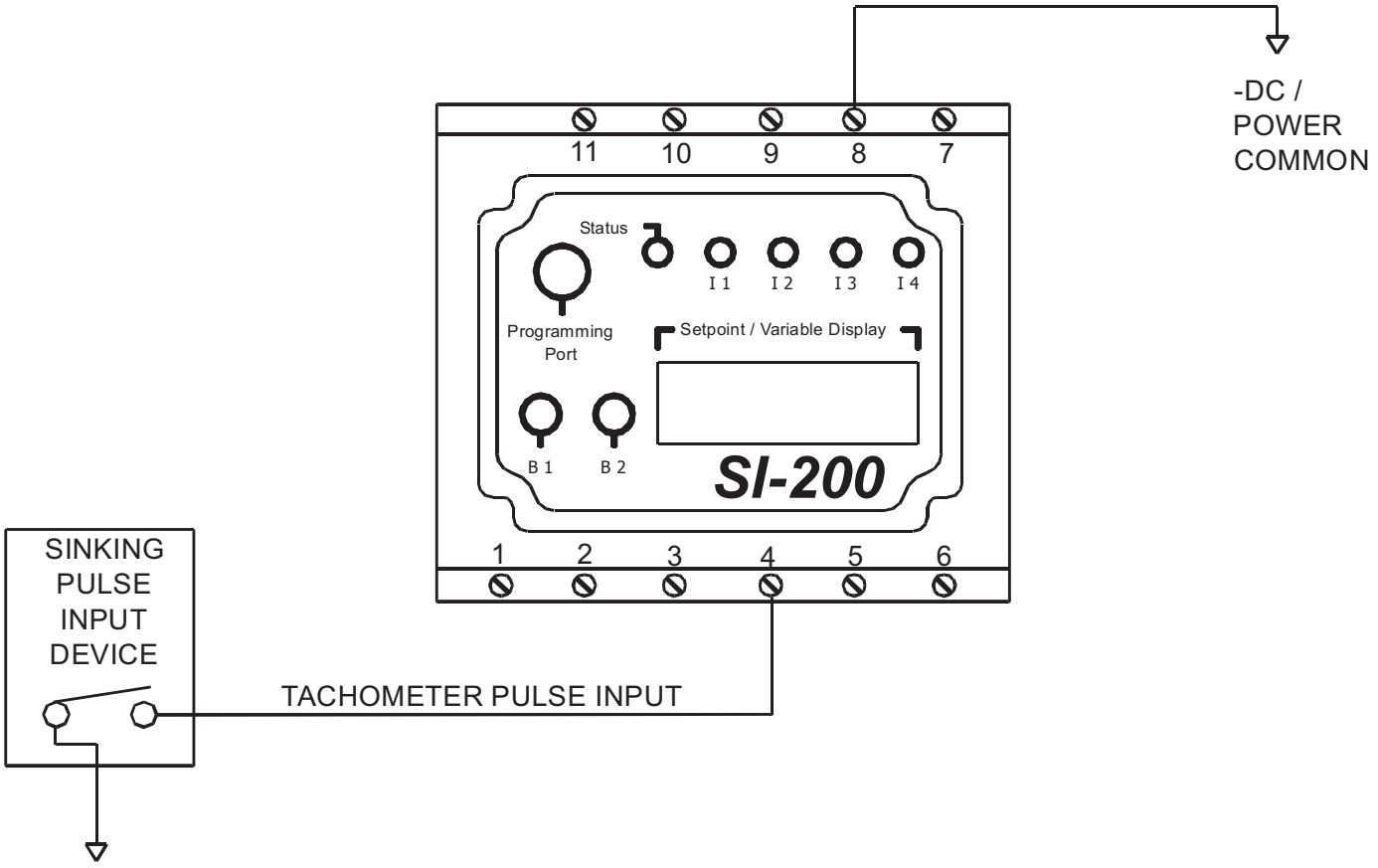



**Figure 2.4 - Pulse Input Connection**

## *OUTPUT CONNECTIONS*

When outputs are energized, the output pin will be sourced with +V (equal to the module input power voltage). Each output can drive a load up to 300mA maximum (resistive). Depending upon the device connected to an output, a minimum load resistor may be required. If the output is energized at all times, connect a 470Ω to 1KΩ load from the output to common. Figure 2.5 is a typical output wiring diagram.

The factory installed software for this module will only allow four outputs to be energized at a time. Max total current for simultaneous outputs is 1ADC. Simultaneous output loads greater than 1A may result in damage to the module. Care must be taken to ensure the loads connected to the outputs if all channels are used does not exceed 1A.

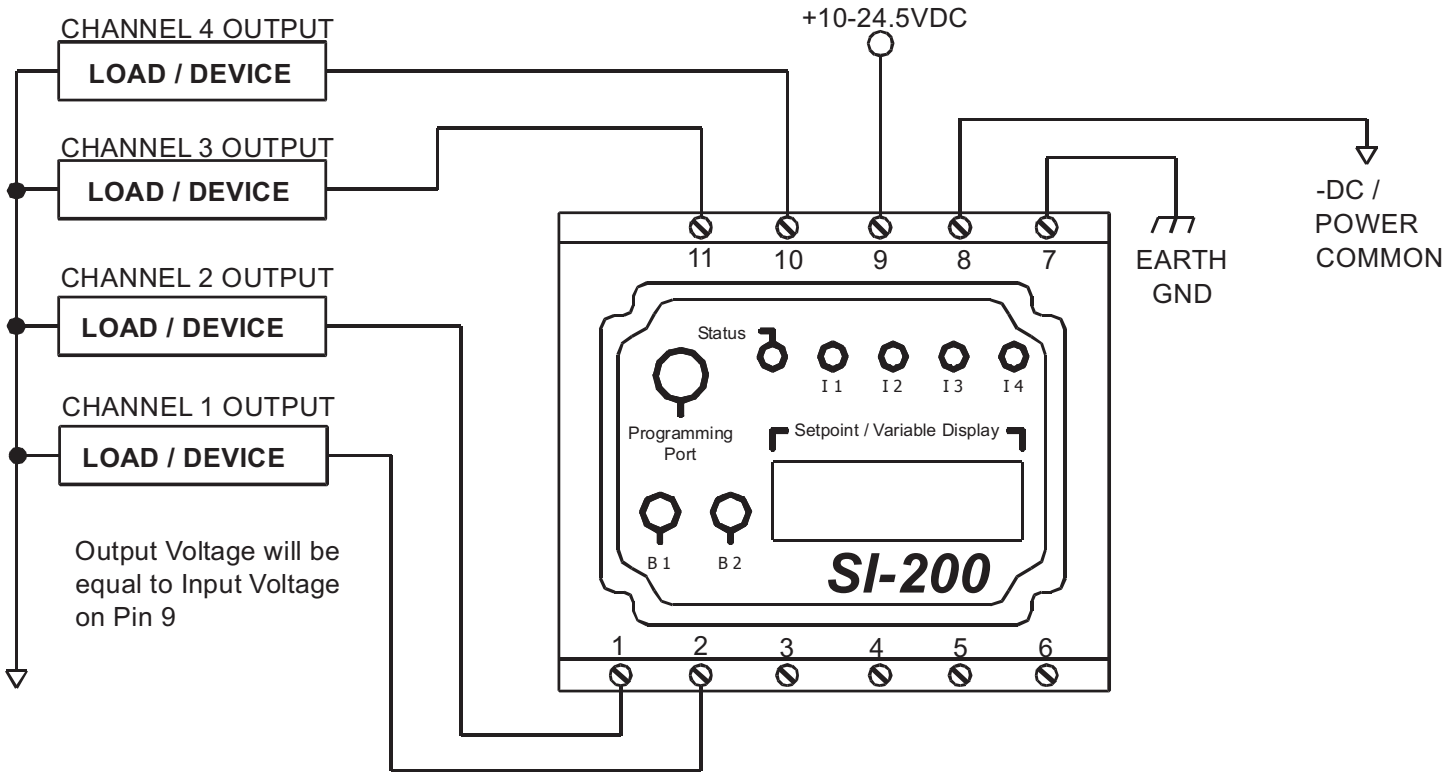



**Figure 2.5 - Typical Output Connections**

## *VIEWING CURRENT SETPOINT VALUES*

The current RPM setpoint for each output can be viewed on the display. As a default on power-up, the actual RPM input is displayed. Press the B1 button to view the first output setpoint (I1 will be on-steady). Press B1 again to view the second output setpoint (I2 will be on-steady). Press B1 again to view the third output setpoint (I3 will be on-steady). Press B1 again to view the fourth output setpoint (I4 will be on-steady). Pressing B1 again will display the current RPM value once again.

## *CHANGING OUTPUT SETPOINTS*

To change a channel setpoint, press B1 repeatedly until the channel setpoint is displayed (See the above section). Once displayed, press the B2 button. The setpoint will increase by 1 (and the indicator for the setpoint viewed will flash indicating that it is being edited). For each press of B2, the RPM setpoint will increment by one. If B2 is pressed and held, after a short delay, the setpoint will increment by tens, then hundreds and by thousands (with a short delay between them). The RPM setpoints can be 0-9999. The setpoint will reset to 0 when it is larger than 9999.

To exit after changing a setpoint, press the B1 button (the indicator LED will stop flashing).

## EXPANDABILITY / CUSTOMIZATION

As the module is based on the Solves-It!, Model SI-200, the program can be customized and its functionality expanded. Accessories are required. The program that was factory installed can be downloaded from ***http://www.divelbiss.com***. The program can be edited to add additional functionality and logic. To gain functionality of some inputs and/or outputs, it may be necessary to re-assign the I/O that was factory configured. For more information about changing the functionality, download the Solves-It! User Manual and the EZ LADDER User Manual.

The following accessories are required to re-program the module and are included in the SI-APPMOD-PGMKIT:

1. SI-PGM — Solves-It! Programming Cable
2. EZLDCD-02 — EZ LADDER Lite on CD.

## PROGRAMMED FROM FACTORY SPECIFICATIONS

| | |
|---|---|
| **Processor**: | Solves-It! Model 200, Based on PLC on a Chip™ |
| **Memory**: | 64K Flash |
| **Outputs**: | 4 Sourcing SSR Outputs, rated 10-24VDC @ 300mADC Max. each. Max total output load = 1ADC @ 24VDC power input. Output Voltage = Input Power<br>Functionality: Setpoint Outputs 1-4 |
| **Power Requirements**: | 10-24.5VDC @ 150mADC Max |
| **Indicators**: | I1-I4 LED Indicator, 1 Status LED Indicator |
| **Counter Inputs**: | 1 Sourcing Input - Count Up, 25KHZ Maximum |
| **Display**: | 4 Digit, 7 Segment Programmable LED Display |
| **Push Buttons**: | 2 Programmable Push Buttons |
| **Operating Temp**: | 0-60º C |
| **Dimensions**: | 3.62” Wide x 5.21” Length x 1.21” Tall. |
| **Mounting**: | Plugs into Industry standard 11-pin Octal Relay Socket |
| **Type**: | Plastic Housing |

# Limited Warranty

Divelbiss Corporation warrants equipment will be free from defects in material and workmanship for a period of one (1) year from the date of the Divelbiss invoice that the equipment was furnished. Divelbiss Corporation will not be liable for any design furnished by Buyer and incorporated into the equipment.

In no event shall Divelbiss Corporation be liable for anticipated profits, consequential damages or loss of use of equipment or of any installation into which the equipment covered by this order may be put.

Divelbiss Corporation shall not be liable or responsible for any loss, injury, or damage resulting directly or indirectly from the use of software and/or programming in any way associated with the equipment of this order.

Obligations are to be limited to the repair or replacement at the Divelbiss Corporation plant, Fredericktown, Ohio, upon return of the part or component in question, prepaid by Buyer. The return freight charges to be paid by Divelbiss. The part or component is only to be returned to Divelbiss with a Returned Material Authorization number issued by the Divelbiss Service Department. Any warranty service (consisting of time, travel, and expenses related to such services) performed other than at Divelbiss Corporation plant, shall be at Buyer's expense.

Warranty of repaired or replacment products will be limited to ninety (90) days or the remainder of the original warranty whichever is greater.

Warranty is available only if Divelbiss Corporation is promptly notified in writing upon discovery of any alleged defect and examination of the subject product discloses, to Divelbiss satisfaction, that any defect has not been caused by misuse; neglect; improper installation; improper operation; improper maintenance, repair, or alteration; accidents; or unusual deterioration or degradation of the equipment or parts thereof due to physical environment or due to electrical or electromagnetic noise environment.

This warranty is in lieu of all other warranties, expressed, implied, or statutory, including warranties of merchantability or fitness for a specific purpose.