

## SOLVES-IT! TWO PUMP ALTERNATOR APPLICATION MODULE

Revision 0 for Software Version 1.0.0.0



PLC on a Chip Patent 7,299,099



Smart Parts for Managing Automation

9778 Mt. Gilead Rd.  
 Fredericktown, OH 43019  
 Toll Free: 1-800-245-2327  
 Web: <http://www.divebiss.com>  
 Email: [sales@divebiss.com](mailto:sales@divebiss.com)

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## WARNING!

The SI-APPMOD-2PUMPALTERNATE, 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	Din-rail Socket	115-105328	In Box
4	Commutating Diodes	111-101012	In Box

# 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:

<b>BOLD</b>	Denotes labeling, commands, and literal portions of syntax that must appear exactly as shown.
<i>italic</i>	Used for variables and placeholders that represent the type of text to be entered by the user.
<b>SMALL CAPS</b>	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.



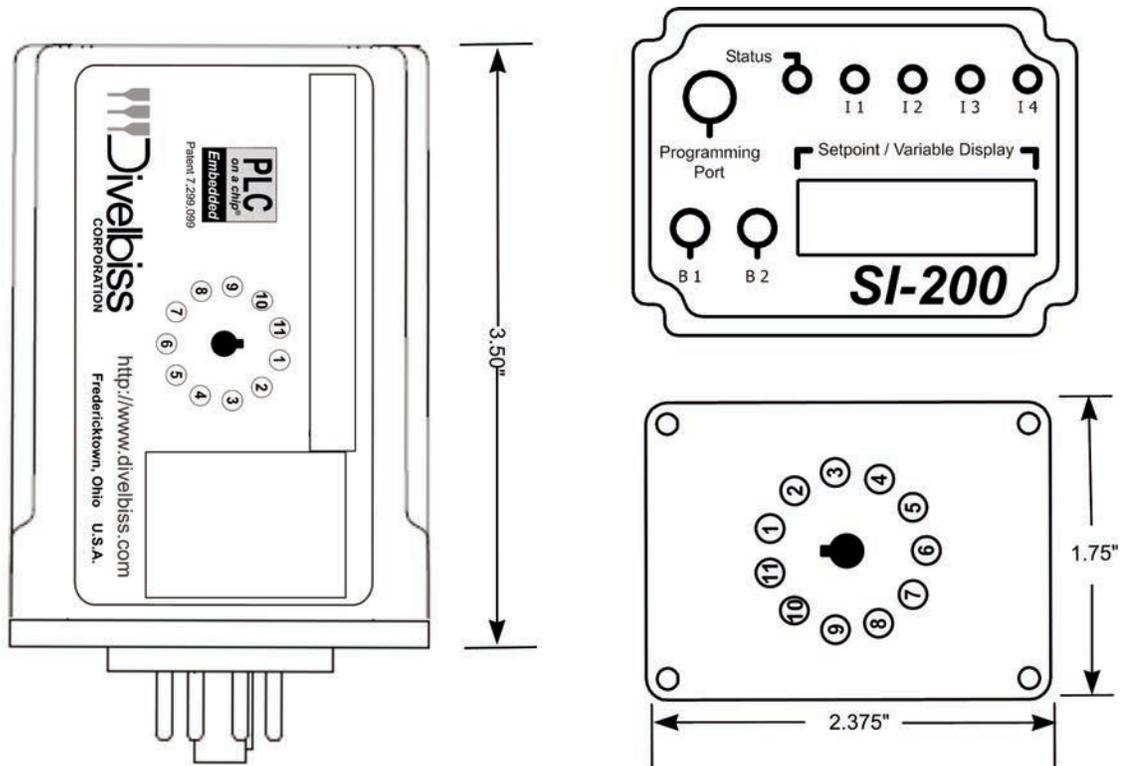
Indicates that the text contains information to which the reader should pay particularly close attention.

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

# MODULE BASICS

This section describes the SI-APPMOD-2PumpAlternate 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	Pump 2 Output
Pin 2	Pump 1 Output
Pin 3	Low Limit (Tank Empty)
Pin 4	Upper Limit (Tank Full)
Pin 5	Tank Overfill Limit
Pin 6	Input 3 - Not Used
Pin 7	Earth Gnd
Pin 8	Input Power Common
Pin 9	10-24.5VDC Input Power
Pin 10	Overfill / Alarm Output
Pin 11	Output 3 - Not Used

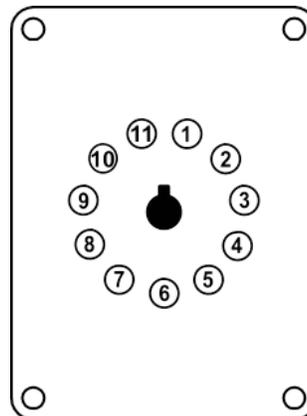


Figure 2.1 - Module Pin-Out

**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 8-32VDC. 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 500mADC. For the pre-programmed software, 3 outputs are used.

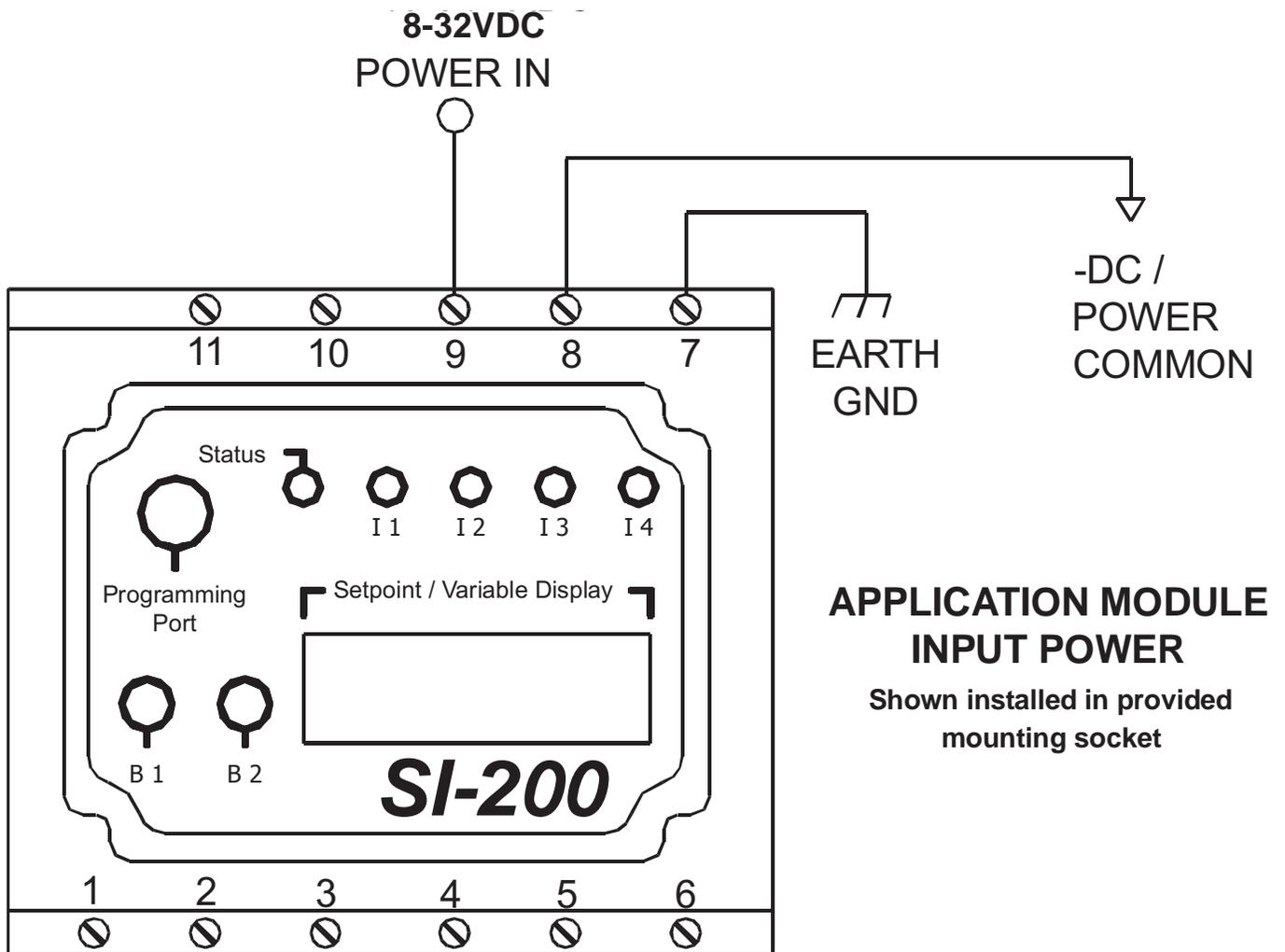


Figure 2.2 - Module Input Power Diagram

## MODULE OPERATION

The SI-APPMOD-2PumpAlternate operates an alternator and tank level control pump control. Refer to Figure 2.3 for an operation diagram.

When the High Limit is true, the current **lead** pump is enabled and will operate. When the Low Limit is detected, the lead and any other operating pumps are stopped (after the High Limit is detected, the Low Limit must be detected to stop the pump from operating). When this happens, the pump that was not the lead pump now becomes the lead pump for the next pumping cycle. In this manner, the pumps will alternate operation (providing only one pump is needed at a time).

If the lead pump is operating and the second pump on-delay timer has elapsed, the second pump will be started as it has detected that the single pump cannot keep up with demand (this does not change the order of the lead pump).

In the event that both pumps have been operating longer than the user programmed unable to meet demand alarm time period, the Overfill / Alarm Output and I4 will begin flashing indicating this alarm condition.

If the Overfill Limit is detected, the Overfill / Alarm Output and I4 will be on-steady until the overfill condition is no longer detected.

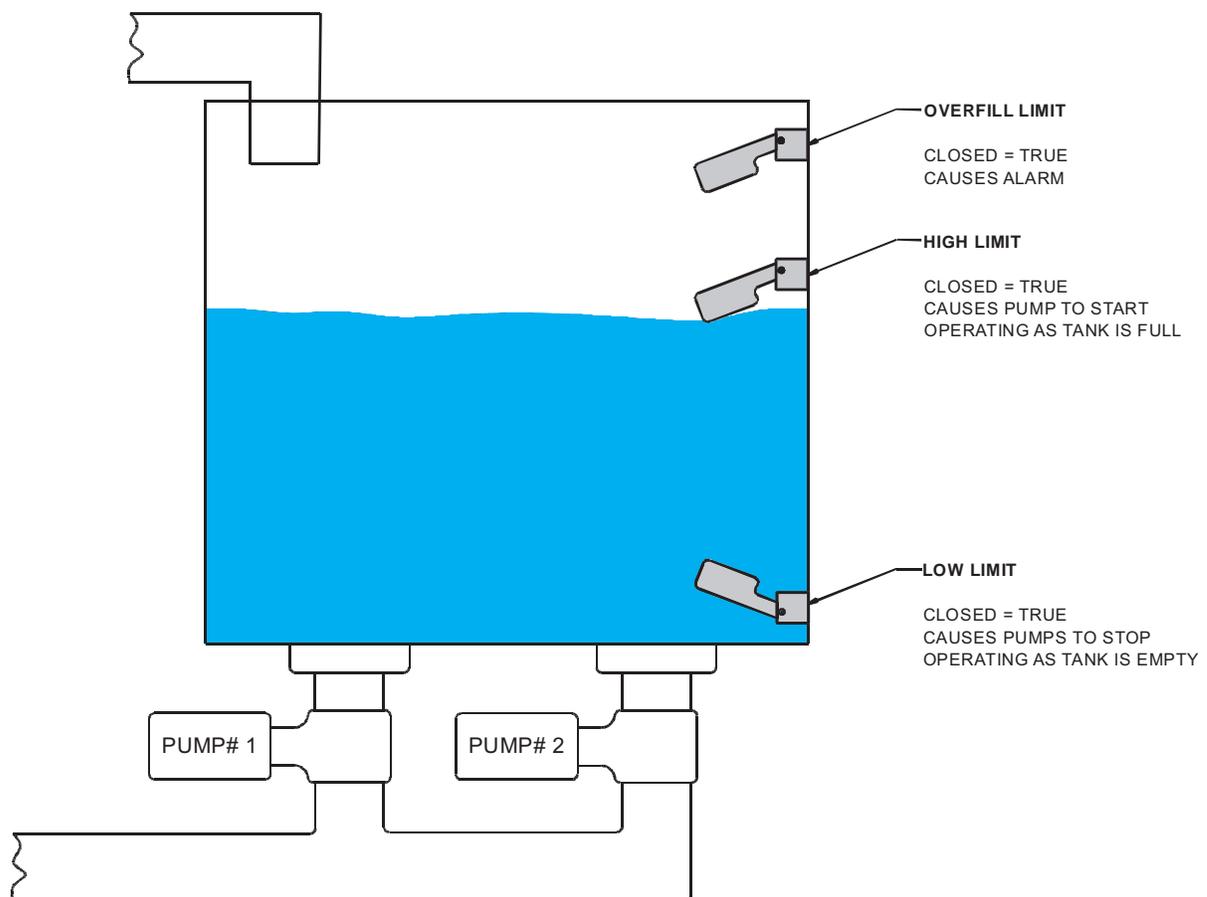


Figure 2.3 - Operation Diagram

## 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.

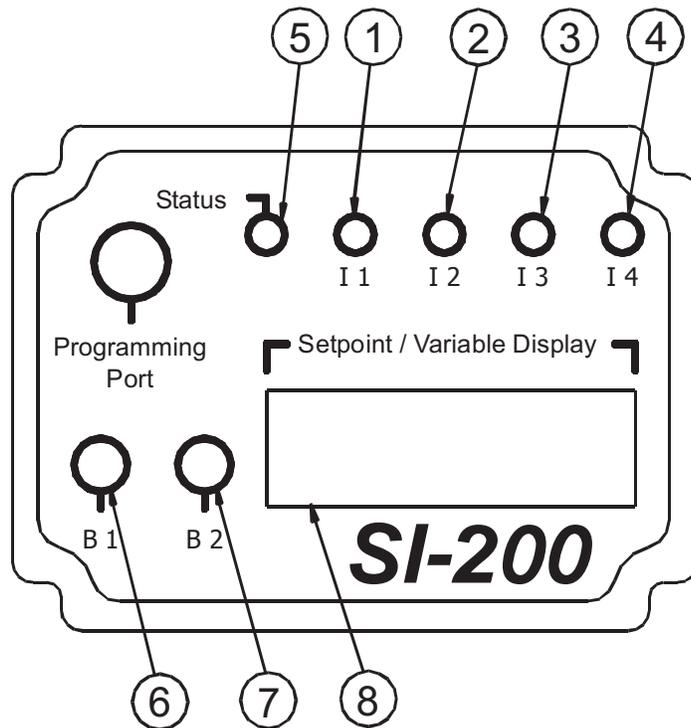


Figure 2.4 - User Interface

## INPUT CONNECTIONS

Three inputs are pre-programmed and must be wired to for this module to function properly. Figure 2.4 provides sample connections. As shown in Figure 2.4, switches are used to illustrate what is required; although, any device that operates the same may be used.

Input 1 is Low Level - Tank Empty Limit. If this input is energized, all operating pumps will shut down immediately.

Input 2 is the High Level - Tank Full Limit and is used to start pumping. When this input is energized, it will start the lead pump (and latch it regardless if it de-energizes).

Input 3 is the Overflow Limit. As long as this input is energized, the Overfill Alarm will be active.

### 1. Indicator 1

Flashing indicates programmable time before the second pump starts is displayed on the Setpoint / Variable Display.

### 2. Indicator 2

Flashing indicates programmable time both pumps run before an alarm is displayed on the Setpoint / Variable Display.

### 3. Indicator 3

Not Used

### 4. Indicator 4

Flashing indicates both pumps have been operating longer the alarm time. Steady indicates an Tank Overfill Alarm condition.

### 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 menu.

1. Run time before 2nd Pump is started in minutes.

2. Both pumps operating time before alarm indicating unable to keep up with demand (in minutes).

### 7. B2 Push-button

For each Time displayed, pressing the B1 will increment the displayed setpoint by one (1). Holding the B2 button will cause the setpoint increment speed to increase.

### 8. Setpoint / Variable Display

View and configure the timer values.

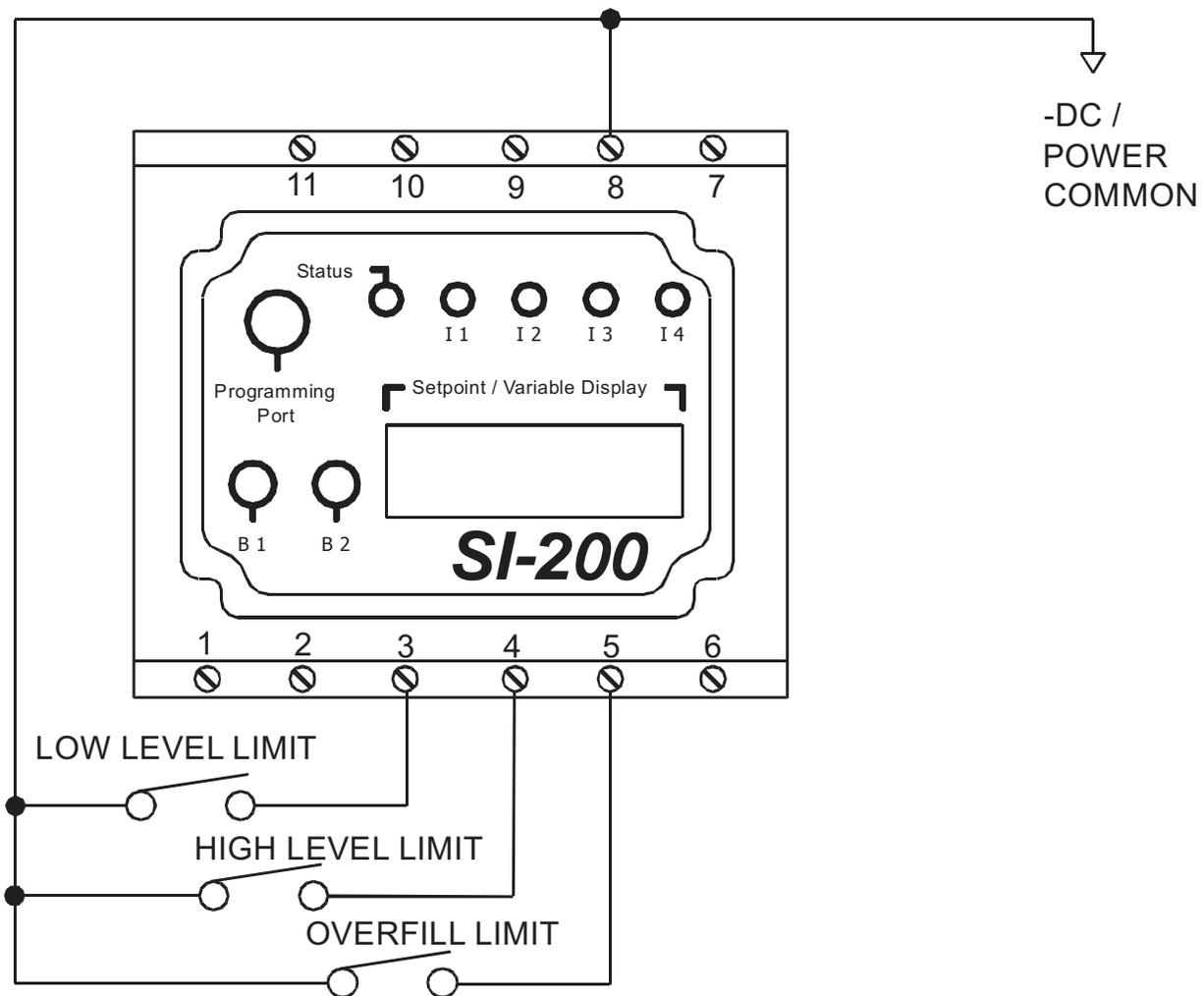


Figure 2.5 - Enable Input Connections

## 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 500mA 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.

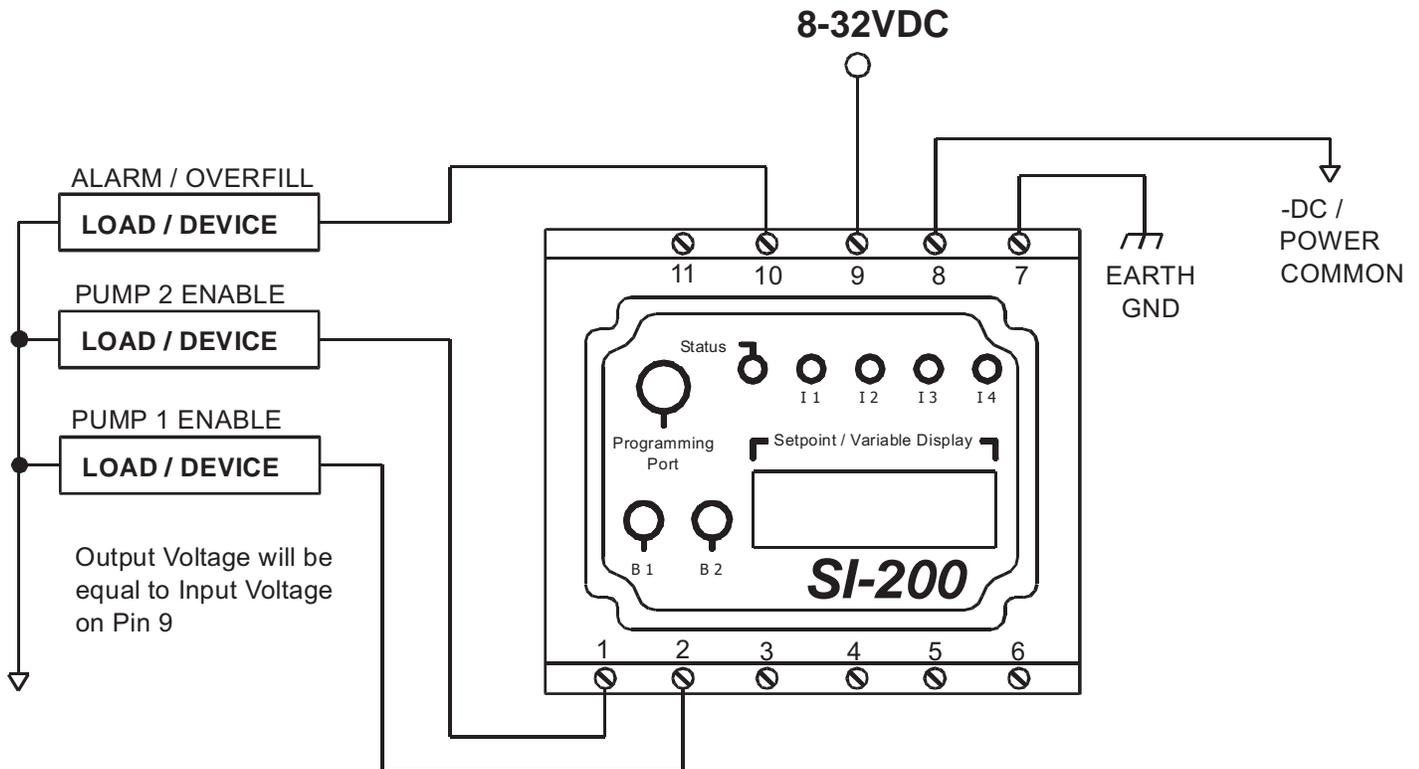


Figure 2.6 - Typical Output Connections

## CHANGING TIME SETPOINTS

The second pump on-delay timer and unable to meet demand alarm timers are set using the user interface. By default, nothing is displayed. By pressing the B1 button repeatedly, the timers may be set. One press displays the 2nd pump enable on-delay timer (time one pump runs before a second pump should start). The I1 indicator will flash to identify this timer setpoint. A second press displays the unable to meet demand (time both pumps run before the alarm is set). The I2 indicator will flash to identify this timer setpoint. A third press will clear the display and turn off all indicators.

## CHANGING THE TIME

1. Using the B1 button, cycle through the menu until the desired timer is displayed (indicated by the flashing I1-I2 indicators).
2. Press the B2 button repeatedly to increment the timer in 1 minute increments. Pressing and holding the B2 button will increase the increment speed. The timer will increase to 600 minutes then reset and begin from zero.

To exit from the setpoint, press the B1 button to the next menu item.

## 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-01 | EZ LADDER on CD.             |

## PROGRAMMED FROM FACTORY SPECIFICATIONS

<b>Processor:</b>	Solves-It! Model 200, Based on PLC on a Chip™
<b>Memory:</b>	64K Flash
<b>Outputs:</b>	3 Sourcing SSR Outputs, rated 8-32VDC @ 500mADC Max. each. Output Voltage = Input Power Functionality: Pump 1 Enable, Pump 2 Enable, Alarm/Overfill
<b>Power Requirements:</b>	8-32VDC @ 150mADC Max
<b>Indicators:</b>	I1-I4 LED Indicator, 1 Status LED Indicator
<b>Digital Inputs:</b>	3 Sourcing Inputs Low Level Limit, High Level Limit, Overfill Limit
<b>Display:</b>	4 Digit, 7 Segment Programmable LED Display
<b>Push Buttons:</b>	2 Programmable Push Buttons
<b>Operating Temp:</b>	-40-65° C
<b>Dimensions:</b>	3.62" Wide x 5.21" Length x 1.21" Tall.
<b>Mounting:</b>	Plugs into Industry standard 11-pin Octal Relay Socket
<b>Type:</b>	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 replacement 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.