

# **μVD - MICRO VALVE DRIVER**

**OPERATION AND INSTALLATION MANUAL**

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**DESCRIPTION:**

MICRO VALVE DRIVER is a state of the art microprocessor based system for controlling electro-hydraulic proportional valves.

There are 2 proportional outputs available, controlled by the two pots on the cover of the valve driver. Each output is designed with short circuit and overload protection.

When power is applied to the Micro Valve driver and the switch is flipped to ON the red LED on the cover will turn on. The green LEDs on the cover show the status of the proportional outputs. They will become brighter, as the current is increased and will become solid when it is at 100%.

**INSTALLATION:**

1. Refer to the WIRING CHART in this manual for wiring connections.

2. To install the Micro Valve Driver control, use the 2 mounting holes provided on the control enclosure. Please take extra caution not to damage internal components while installing the unit.

3. When installing the unit, the main power should run from the battery, through a 10 amp fast blow fuse. Use 18 gauge or heavier wire.

4. All connections must be properly insulated to protect against shorts.

**BEFORE APPLYING POWER:**

1. Check power and ground for correct polarity.

2. Check wiring harness for possible shorts before connecting control to output devices (i.e., valves, relays) by checking each mating pin terminal.

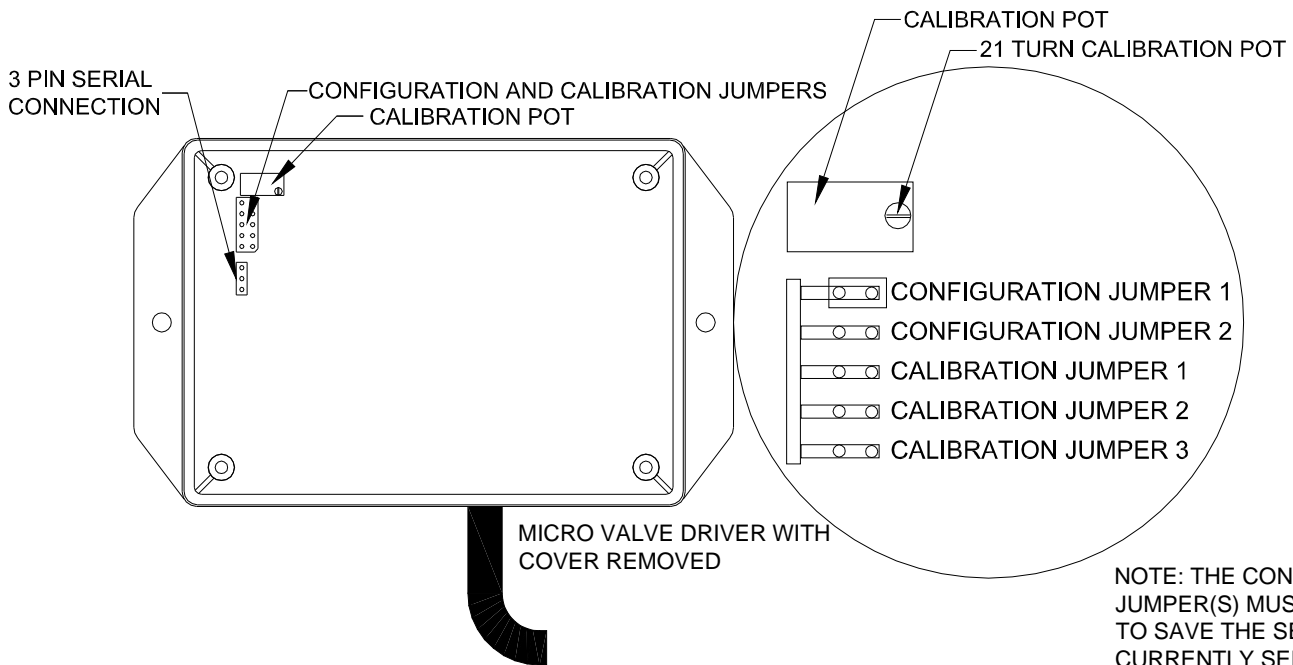
3. Read the rest of this manual.

**Table 1: Configuration Jumper Settings**

Configuration Option	Configuration Jumpers to Install
1 Input / 1 Output	Configuration Jumper 1
1 Input / 2 Output	Configuration Jumper 2
2 Input / 2 Output	Configuration Jumpers 1 and 2

**Table 2: Calibration Jumper Settings**

Output Parameter	Calibration Jumpers to Install
Proportional Output 1 Minimum	Calibration Jumper 1
Proportional Output 1 Maximum	Calibration Jumper 2
Proportional Output 1 Ramp Time	Calibration Jumpers 1 and 2
Proportional Output 2 Minimum	Calibration Jumpers 1 and 3
Proportional Output 2 Maximum	Calibration Jumpers 2 and 3
Proportional Output 2 Ramp Time	Calibration Jumpers 1, 2, and 3
Proportional Outputs Frequency	Calibration Jumper 3



NOTE: THE CONFIGURATION JUMPER(S) MUST BE REMOVED TO SAVE THE SETTING FOR THE CURRENTLY SELECTED PARAMETER BEFORE SELECTING THE NEXT PARAMETER TO CONFIGURE.

### Calibration Using the Jumpers -

The  $\mu$ VD can be calibrated using the on-board jumpers. Refer to the jumper detail drawing on page 2 for the location of these jumpers. The default calibration setting is 2 input/2 output.

To calibrate the  $\mu$ VD, first apply power to module. Flip the switch on the cover to ON, the red LED on will turn on. Then install the jumpers for the desired configuration as shown in table 1 on page 2.

The CONFIGURATION jumpers must be left installed for the configuration setting to remain active. Changing the configuration jumper settings at any time immediately changes the  $\mu$ VD configuration. **Warning:** when any of the input/output pairs are initially made active by installing any of the configuration jumpers, if an input voltage is present on the input(s) when the configuration jumper is installed, the corresponding output(s) will immediately come on. Ensure that the outputs are not connected to the equipment when performing  $\mu$ VD configuration.

Note: when the 1 Input/ 2 Output configuration is chosen, the input voltage range for analog input 1 is

divided into a high side and a low side corresponding to the high side and low side from the center voltage of a joystick . The high side input corresponds to proportional output 1 and the low side corresponds to proportional output 2.

The individual output parameters can be calibrated using the three CALIBRATION jumpers along with the 21 turn calibration pot. To set the individual parameters, install the jumper or jumpers to select the desired parameter as shown in table 2 on page 2. Then turn the adjustment screw on the calibration pot CW to increase or CCW to decrease the currently selected parameter. When the parameter has been adjusted to the desired level, **simply remove the jumpers and the new value will be saved.** Note: when calibrating  $\mu$ VD parameters using the calibration jumpers, the currently selected parameter will not change until the calibration pot adjustment screw has been turned one full turn in either the clockwise or counterclockwise direction.

To restore all of the  $\mu$ VD parameters to the default factory settings perform the following steps:

1. Remove power from the module.
2. Install all five jumpers

- (Configuration and Calibration).
3. Reapply power to the module. Both the red and green LEDs will come on and stay on steady.
  4. After power has been on for five seconds, remove all five jumpers, then remove power.
  5. Install jumper on configuration jumper 1 and 2 for 2-2 configuration and apply power.

At this point the  $\mu$ VD will power up with the factory calibration settings. When any of the inputs and outputs is then made active by installing the configuration jumpers, the inputs and outputs will initially have these factory settings. The factory calibration settings for 1 Input/ 1 Output or 2 Input/ 2 Output configurations are:

#### Analog Inputs

Min. - 0.5V

Max. - 4.5V

#### Proportional Outputs

Min. - 400mA

Max. - 1400mA

Ramp times - 0 Sec.

Freq. - 75Hz

The factory calibration settings for the 1 Input/ 2 Output configuration are:

#### Analog Input

Low Side - 0.5-2.25V

High Side - 2.75-4.5V

#### Proportional Outputs

Min. - 400mA

Max. - 1400mA

Ramp times - 0 Sec.

Freq. - 75Hz

Note: When returning the  $\mu$ VD to factory settings, any calibration adjustments that had previously been made will be lost, including blast rate.

#### Calibration of the Blast Rate -

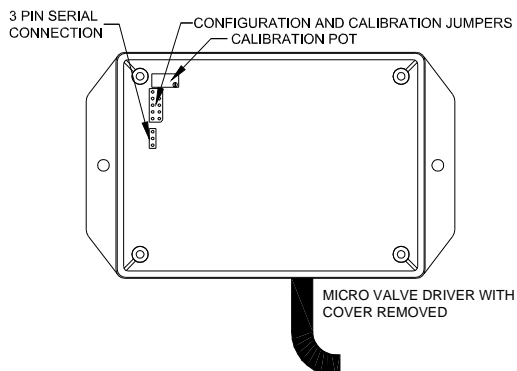
When the BLAST button is pressed the two proportional outputs will turn on to their programmed blast flow rate. **Warning: the outputs will turn on to their set position when the BLAST button is released.** To set the blast rate values use the following procedure:

1. Turn off the POWER to the valve driver
2. Turn both knobs to the desired position for each blast flow rate
3. Press and hold BLAST button
4. Turn on the POWER to the valve driver
5. Release BLAST button
6. Blast rates are set

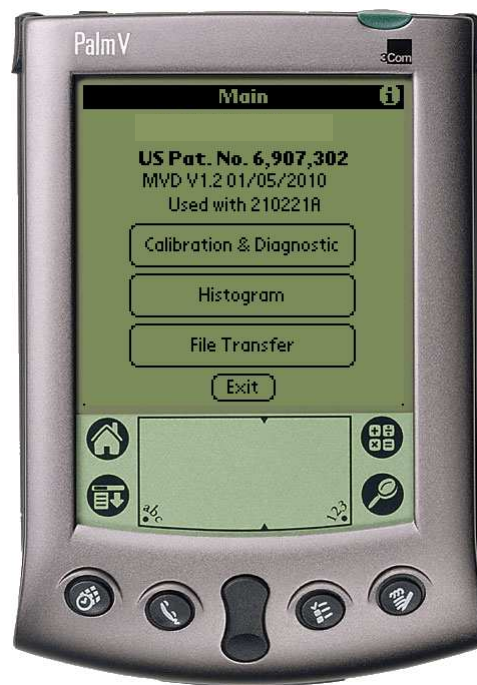
### SYSTEM CALIBRATION USING OPTIONAL PALM PILOT™:

The Patented Palm Pilot™ interface, US patent No. 6,907,302, software is a very useful tool for configuring and calibrating the control system. The  $\mu$ VD module application allows the user to configure the control as a 1 Input/ 1 Output control, a 1 Input/ 2 Output control, or as a 2 Input/ 2 Output control. The user can then also calibrate the parameters for the proportional outputs and analog inputs.

Connect the Palm Pilot™ interface to the 3-pin serial connector on the  $\mu$ VD control board, see the figure below for the location of the 3-pin serial connector. Turn on the control unit and Palm. Tap the icon **UVD V1.0** to bring the MAIN screen up.



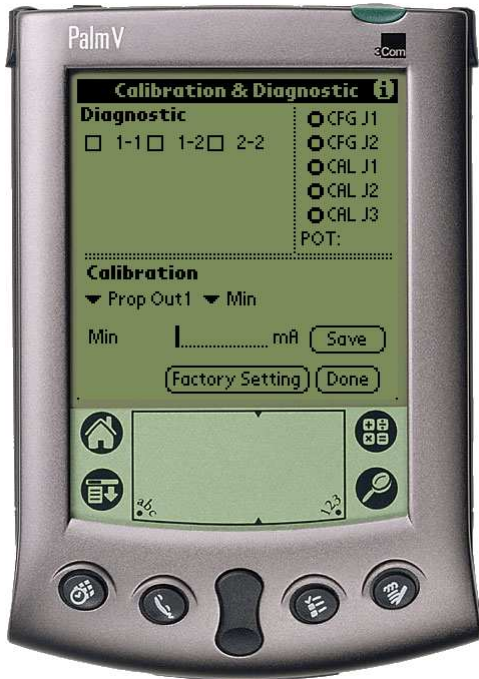
$\mu$ VD with cover removed



### CALIBRATION & DIAGNOSTIC

To set inputs and outputs to match valves and joysticks, tap the CALIBRATION & DIAGNOSTIC button. A password is required to gain access to this section. The password is 1262.

After entering the password, the following screen will appear:



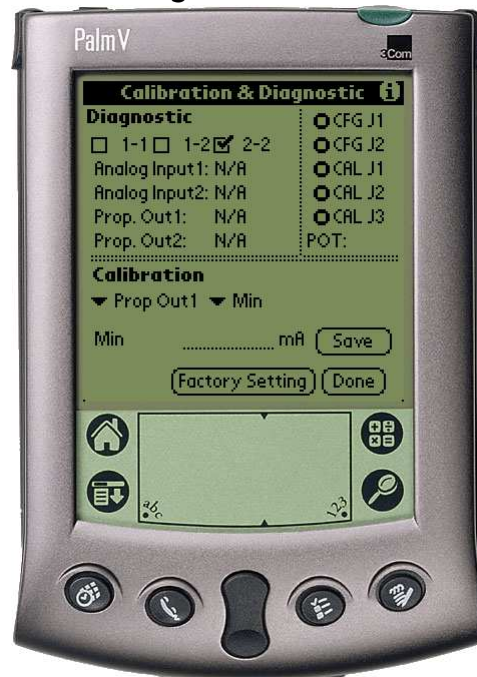
If the “Check Palm Link” message is flashing in the middle of the screen, just to the right of CALIBRATION, check the connection to the 3-pin serial connection of the  $\mu$ VD control board and the connection to the Palm Pilot.

The upper left portion of the screen labeled DIAGNOSTIC shows the three possible configuration choices for the  $\mu$ VD: 1 Input/ 1 Output (1-1), 1 Input/ 2 Output (1-2), or 2 Input/ 2 Output (2-2). Select the desired configuration by tapping the box to the left of the desired choice. A checkmark will appear in the box to the left

of the currently selected configuration.

Note: when the 1 Input/ 2 Output configuration is chosen, the input voltage range for analog input 1 is divided into a high side and a low side corresponding to the high side and low side from the center voltage of a joystick . The high side input corresponds to proportional output 1 and the low side corresponds to proportional output 2.

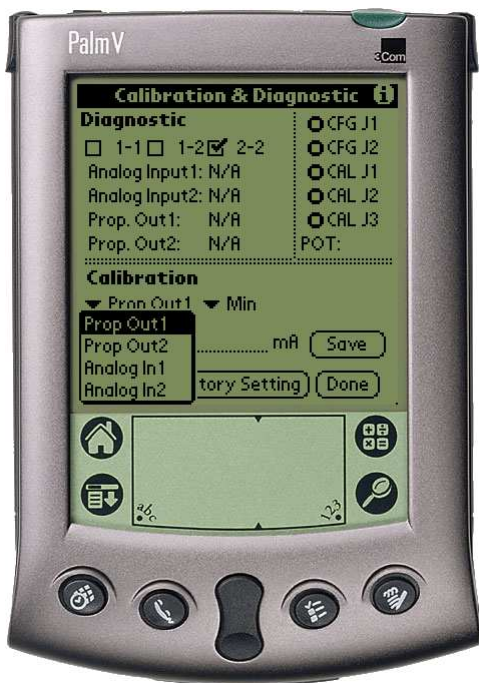
When one of the three configuration options has been selected, the current status of the inputs and outputs that have been made active is displayed in the DIAGNOSTIC box underneath the three configuration checkboxes.





After configuring the number of inputs and outputs, the CALIBRATION section on the bottom of the screen can be used to calibrate the parameters for the active inputs and outputs.

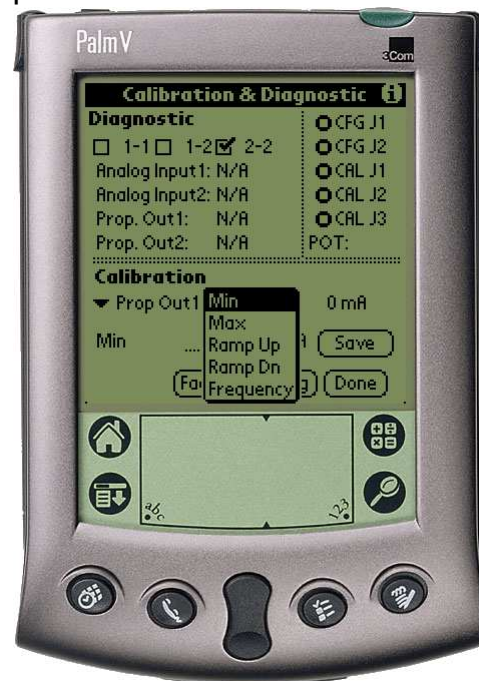
There are two pull down lists to choose from in this section. The first (on the left) is a list of the currently active inputs and outputs that can be calibrated. Tap on the down arrow to the left of "Prop Out 1" to expand the list as shown.



Choose which input or output to calibrate from this list. The currently selected input or output is then displayed next to the down arrow.

Next choose which parameter to calibrate for the currently

selected input or output by expanding the pull down list next to the second down arrow (to the immediate right of the first list), and selecting the desired parameter.



The currently selected parameter will be displayed to the left of the dotted field just below the two pull down lists. To change the currently selected parameter setting, enter the new value using the scratch pad on the bottom of the Palm, or using the integrated keypad. After the new value has been entered, tap the SAVE button to save the new value. Tap the DONE button to exit the CALIBRATION & DIAGNOSTIC section.

Note: The Min and Max values for the Analog Inputs are entered in

Volts. The Min and Max values for the Proportional Outputs are entered in Milliampères, the ramp times are entered in Seconds, and the frequency is entered in Hertz. Tapping the Factory Settings button will restore the  $\mu$ VD to the default factory settings that it was shipped with. Any changes made using the Calibration procedure will be lost. The factory settings will disable both inputs and both outputs. When either of the Analog Inputs or Proportional Outputs is made active for the first time, they will be assigned the default factory parameters. **Warning: when any of the input/output pairs are initially made active, if an input voltage is present on the input(s) when the configuration box is checked, the corresponding output(s) will immediately come on. Ensure that the outputs are not connected to the equipment when performing  $\mu$ VD configuration.**

The default factory parameters for 1 Input/ 1 Output or 2 Input/ 2 Output configurations are:

Analog Inputs

Min. - 0.5V

Max. - 4.5V

Proportional Outputs

Min. - 400mA

Max. - 1400mA

Ramp times - 0 Sec.

Freq. - 75Hz

The default factory parameters

for the 1 Input/ 2 Output configuration are:

Analog Input

Low Side - 0.5-2.25V

High Side - 2.75-4.5V

Proportional Outputs

Min. - 400mA

Max. - 1400mA

Ramp times - 0 Sec.

Freq. - 75Hz

The allowable limits for these parameters are:

Analog Inputs:

Min. - 0V

Max. - 5V

Proportional Outputs

Min. - 0mA

Max. - 5000mA

Ramp times - 0-2 Sec.

Freq. - 30-500Hz

Note that the Max. value for each proportional output must be at least 300mA greater than the Min. value to maintain stable output.

The  $\mu$ VD can also be configured to function as a ramp card. Simply configure the module for 1 Input/ 1 Output or 2 Input/ 2 Output operation. Then calibrate the minimum input voltage to 0V and the maximum input voltage to 5V, and calibrate the proportional output(s) minimum and maximum values and ramp times as desired. A switch input can then be used to switch between the min. and max. output values.

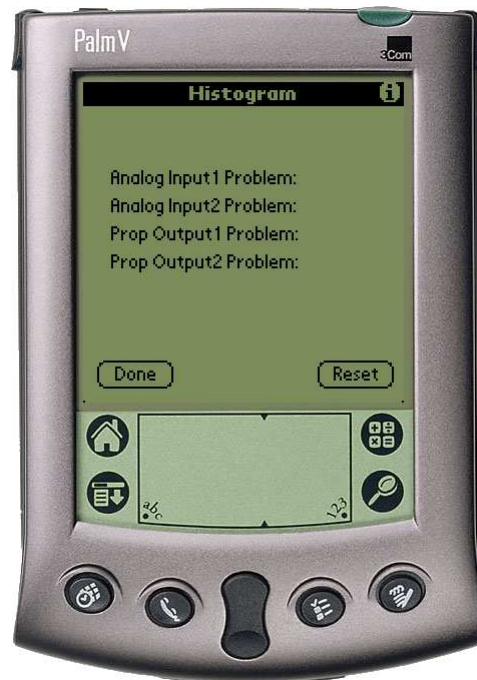
Note: The maximum input value

that the  $\mu$ VD will recognize and that can be configured is 5V. The module can however accept voltages higher than 5V on the analog inputs. Any input higher than 5V will be read as an input of 5V.

**Warning:** when switching a voltage greater than 15V onto the analog inputs, a 5.1k or 4.7k ohm resistor **must** be installed in series between the switch and the input to avoid damaging the  $\mu$ VD.

### HISTOGRAM

Tap the HISTOGRAM icon on the MAIN screen. This will take the user to a screen that shows which error codes are active and how many times the specific error code has been active. This feature can be used to troubleshoot machine wiring and other problem areas. A star to the left of an error indicates that error is currently active. The number to the right of each error shows how many times that error has been active. Press the RESET button to reset all the error code counts to zero. This operation should be performed after installation of the system on the equipment.



Press the “i” button in the upper right-hand corner of the display for more information about the HISTOGRAM function. Tap DONE when finished to return to the MAIN screen.

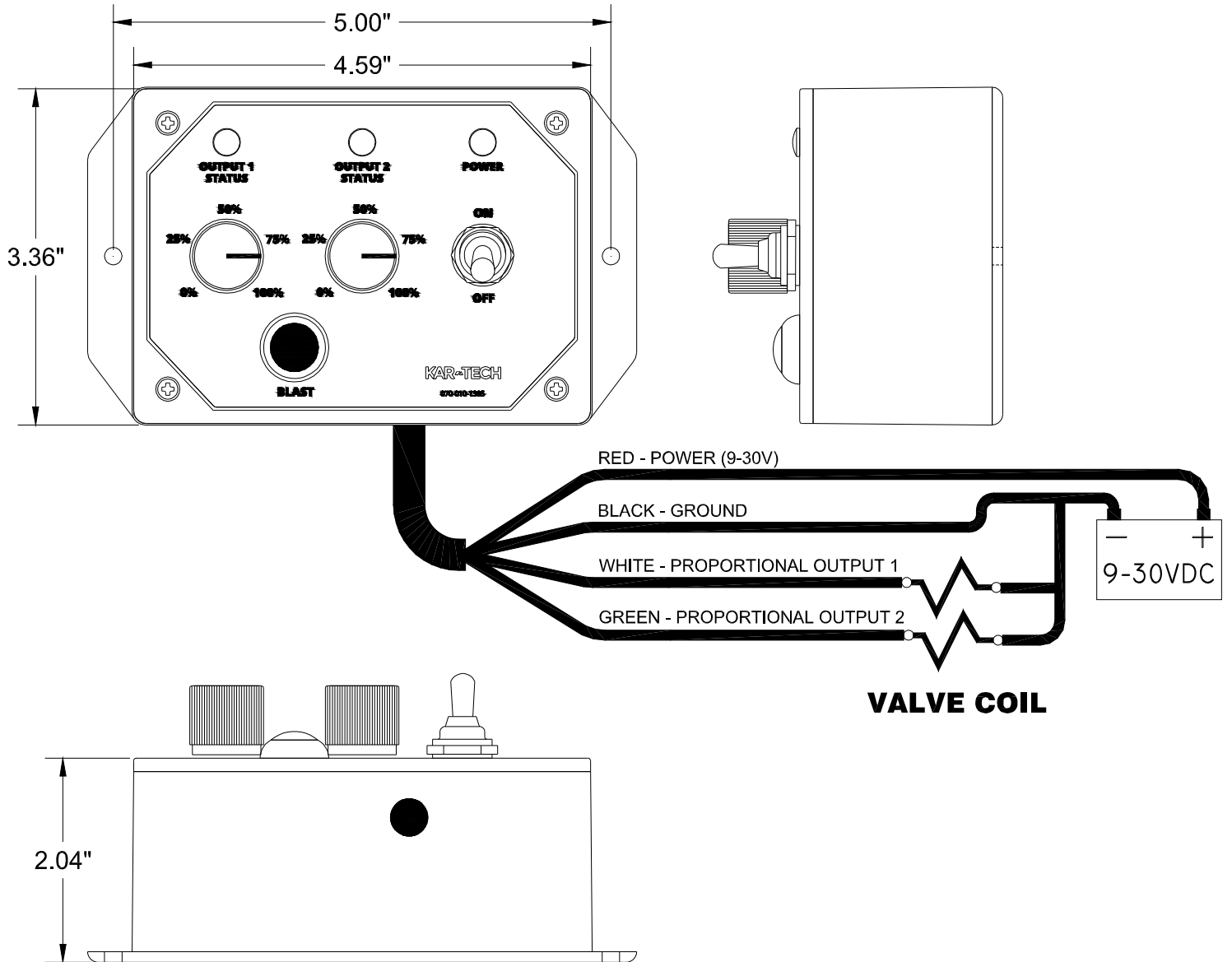
### FILE TRANSFER

Tap the File Transfer button to send new program files from the Palm to the receiver. New programs are uploaded to the Palm via the Palm™ desktop as a \*.pdb file using HotSync™.



This is only used for software updates to the receiver. Tap the 'i' icon for more information on this procedure.

# WIRING



μVD Control Module

**ROUTINE MAINTENANCE:**

1. Inspect electrical wiring for wear points or other damage. Repair as required.
2. Inspect all connections for looseness or corrosion. Tighten and/or "seal" as necessary.

**MAINTENANCE PRECAUTIONS:**

When performing any inspection or maintenance work on the MICRO VALVE DRIVER system, always exercise care to prevent injury to yourself and others or damage to the equipment. The following are general precautions that should be closely followed in carrying out any maintenance work.

1. Do not have hydraulic power available to the valves when performing electrical tests.
2. Never operate or test any function if any person is in an area where they could be hurt, hit or squeezed by the hydraulic equipment.
3. Turn power off before connecting or disconnecting valve coils or other electrical loads.

**TROUBLESHOOTING:**

This section provides basic operator level troubleshooting for the MICRO VALVE DRIVER system. If, after following these instructions, the system still does not function, check the hydraulic system, and then contact your KAR-TECH representative for further instructions or servicing.

**TROUBLESHOOTING CHART**

<b>PROBLEM</b>	<b>SOLUTION</b>
<b>1. No functions work</b>	<ol style="list-style-type: none"><li>1. Check that control power is on.</li><li>2. Check vehicle wiring for power into the system.</li><li>3. Check status and error code LEDs for system status.</li><li>4. Check for proper grounding of vehicle's electrical circuit.</li><li>5. Check vehicle's hydraulic system.</li></ol>
<b>2. Certain functions do not work</b>	<ol style="list-style-type: none"><li>1. Check the wiring connection from the system to the valve coil or the output function that does not work.</li><li>2. Check status and error code LEDs for system status.</li><li>3. Check vehicle's hydraulic system.</li><li>4. Check vehicle's electrical system.</li></ol>
<b>3. Function operates intermittently</b>	<ol style="list-style-type: none"><li>1. Check for loose connections.</li><li>2. Check status and error code LEDs for system status.</li><li>3. Check vehicle's hydraulic system.</li></ol>

PARTS LIST

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
210229A	MICRO VALVE DRIVER MODULE
420269A	DB9 TO 3 PIN SERIAL CONNECTION CABLE
B40022C	PALM PILOT WITH PROGRAM
B40025B	PALM PILOT CONNECTION HARNESS

Note: For operation with negative ground vehicles only.



**SPECIFICATIONS**

Power supply voltage .....	9V to 30V
Operating temperature .....	-20° C to +70° C
Storage temperature .....	-40° C to +85° C
Analog Inputs .....	0.5V to 4.5VDC
Proportional outputs .....	5.0 Amp. MAX (Protected)
Vibration .....	3G to 200Hz
Shock.....	100G