

# Model VD4 POWER PAK Installation Manual

## TABLE OF CONTENTS

I. PRODUCT DESCRIPTION .....	2
II. THEORY OF OPERATION .....	2
III. PRELIMINARY ADJUSTMENTS.....	2
IV. OPERATION .....	2
V. SPARE PARTS LIST .....	2
VI. WARRANTY .....	3
VII. SERVICE/START-UP ASSISTANCE .....	3
VIII. UPGRADES - REVISIONS .....	3
IX. TROUBLE-SHOOTING GUIDE.....	3

### I. PRODUCT DESCRIPTION

The VD4 Shot Flow Power Pak will control the rate of flow of steel shot passing through a special normally closed magnetic valve called a MagnaValve. An auxiliary setpoint potentiometer (EI part No. 999163) or an external 0-10 Volt dc command signal is used to set the shot flow rate.

The VD4 Power Pak is usually connected to the following series of MagnaValves:

Model 25	0-700 pounds/min.
Model 50	0-1200 pounds/min.
Model 100	0-2400 pounds/min.

NOTE: Earlier versions of the VD4 Power Pak had optional choices for power transformer of 36Vac or 48Vac. We discovered that the 48Vac transformer could be used in all MagnaValve applications. Therefore the latest version of the VD4 Power Pak will have a 48vac transformer and it will be suitable for use for any of the above MagnaValves.

### II. THEORY OF OPERATION

The MagnaValve is a normally closed magnetically operated valve with no moving parts. A very powerful permanent magnet will hold the shot and prevent flow. An electromagnet coil inside of the valve is used to cancel the permanent magnet field and allow shot to flow. The VD4 Power Pak supplies the voltage to the MagnaValve and provides 0-100% regulation of flow rate. The voltage is applied as a variable duty cycle output at a fixed frequency of 10 Hertz. The longer the "ON" time, the higher the flow. Full duty cycle, 100% on-time, is full-flow condition. The "perfect cancellation" of the magnetic field is obtained

### III. PRELIMINARY ADJUSTMENTS

#### Maximum Output Limit:

On wheel type blast machines it is usually desirable to limit the maximum motor amps by restricting the maximum shot flow rate to the wheel. The maximum output signal that the operator can request from the setpoint potentiometer may be restricted to prevent excessive flow rates that might overload the wheel motor. Turn the *maximum output* trimpot to the counter-clockwise position for minimum flow. Turn the *operator's setpoint* knob to full clockwise position. Enable the Power Pak. Turn the *maximum output* trimpot clock-wise until the desired maximum flow rate is achieved.

### IV. OPERATION

To energize the MagnaValve the VD4 Power Pak must be activated. This is done by applying 120Vac power to the VD4 power input terminals #1 and #2.

The flow rate command can come from the auxillary setpoint potentiometer (EI part No. 999163) or from a remote 0-10 Vdc command.

A red LED is provided to indicate status of the output signal to the MagnaValve. It has three modes:

1. it will be off for no-flow
2. it will be blinking for low flow rates
3. it will be constantly on for maximum flow rate

The signal is a fixed frequency variable duty cycle (PWM) type of output. Low "ON" times relate to low flow rate. Longer "on" times provide larger flow rates.

### V. SPARE PARTS LIST

For each machine, at least one of each of the following is recommended:

- a. Spare VD4 Control

### VI. WARRANTY

Electronics Incorporated warrants this product to be free from defect in material and workmanship for a period of two years from date of shipment. Defective units must be returned to Electronics Incorporated with shipping costs prepaid. Call for a Return Authorization Number and shipping instructions. Electronics Incorporated will repair or replace defective unit at its option. No consequential liability is assumed. No other warranty, including merchantability or fitness for purpose, applies or is expressed or implied.

Warranty work is only available at the factory. On-site service or start-up assistance is available at extra cost to customer. See Section VII.

Caution: Any customer attempts to modify or repair the product during the warranty period will terminate the warranty. Standard technician labor rates will be quoted prior to repair work.

### VII. SERVICE/START-UP ASSISTANCE

Service is an option available at the time of original purchase or as required by customer. A purchase order is required prior to making a service call.

## VIII. UPGRADES - REVISIONS

Design improvements are constantly being made to our products. Please contact Electronics Incorporated for details. When ordering spare units, please refer to model number and serial number of each unit.

## IX. TROUBLE-SHOOTING GUIDE (WHEEL TYPE BLAST MACHINES)

### 1. SYMPTOM: Problems with stability

The instability may be caused by flooding or choking the wheel or trying to flow more shot than the wheel is capable of throwing. This is especially a problem with variable speed wheels. Lower flow rates may be needed at higher wheel RPM's.

Check for obstructions or restrictions or unnecessary bends in the flow path.

Worn blades or damaged control cages will not pass as much shot as new blades, therefore as blades wear the maximum shot flow rate is reduced.

Use a clamp-on type ammeter to verify panel meter ammeter reading. Occasionally, the number of wraps of wire around the panel meter current transformer is incorrect, or the current transformer ratio is not correct for the load amperage and meter range.

Shot condition is very important. Unclean shot, due to oil, water or dust, can cause erratic flow performance. The dust can be generated by shot deterioration, or by abrasion of the parts being peened or the cabinet or tooling. The dust will tend to cake and clog the flow. Under severe conditions, the MagnaValve may become completely blocked.

### 2. SYMPTOM: *Setpoint* does not control flow rate.

a. MagnaValves operate using a magnetic field and have no moving parts. High differential air pressure caused by wheel rotation causes suction which may suck shot through the valve. This symptom is characterized by having shot flowing when valve is off (red valve LED = off). It may be necessary to provide an aspiration air inlet below the MagnaValve.

b. MagnaValve valve driver module may be defective. The valve driver module is factory set and is used to regulate the precise amount of current necessary to cancel the permanent magnet field in the MagnaValve. If this module fails there may be no current or excessive current. The correct valve driver module current setting is listed on the valve driver module. Check the valve current with an ammeter in series with wire lead from the Power Pak (screw terminal #5) to the valve driver module (screw terminal #1). The dc current should be within 10% of the listed value. If it is not, try to adjust it using the trimpot located on the valve driver module. If this does not change the MagnaValve current then replace the valve driver module. The new valve driver module must be set to the value listed on the old valve driver module to properly operate. Contact factory for assistance.

### 3. SYMPTOM: Cannot achieve any flow, or flow rate is very low.

a. Green LED for "*Power*" must be on.

b. Red LED "*Valve*" should be bright and blinking or constantly on. An internal circuit breaker has tripped. If it is dim, check for short circuit valve wiring at Terminals #5 and #6. To reset the circuit breaker, remove and re-apply the power to the VD4 Power Pak.

c. Check red LED at MagnaValve junction box. If it is not "on" check for a wiring problem. If it is "on" check the current going to the valve driver module and see that it matches the label on the valve driver module.

d. Check for contamination in or above MagnaValve, especially check for water, oil, or dust mixture in the shot.

e. MagnaValve or valve driver module may be defective. To check, remove valve from machine (be sure to close the slide-gate above the MagnaValve (keep wires attached). Enable the flow and get red LED valve "on" at 100% duty cycle. When *Valve* LED is on, the magnetic field should be

perfectly canceled. No shot should stick inside the MagnaValve. If any shot sticks to the valve, then either the valve driver module or the MagnaValve is defective. Measure the dc current going to the valve driver module Compare your measurement to the value written on the label of the valve driver module. If your reading is not within 10%, then the valve driver is defective or not adjusted properly. Try adjusting the drive current to the listed value. If the current does not change with adjustment then the valve driver module is defective and must be replaced. Be sure the replacement valve driver is pre-calibrated to the same value as the original module. If your reading is within 10% of the original valve driver calibration, the valve driver module is OK but the valve is defective.

4. SYMPTOM: Often have high flow or flow continues when *setpoint* is reduced VD4 power turned off. Valve is leaking shot.
  - a. This is usually caused by pressure difference across the valve. Some wheels at some speeds and flow rates tend to provide a large vacuum and this may suck shot through the MagnaValve. Relieve this negative pressure by providing a hole (1/2" diameter) in the hose immediately below the MagnaValve. This allows aspiration air to help convey the shot to the wheel inlet.
5. SYMPTOM: Green power "LED" is not on
  - a. Check for power at terminals #1 and #2
  - b. Check the fuse F! input power fuse. Replace with AGC-1 or equal
6. SYMPTOM: Red valve "LED" is not on
  - a. Check the fuse F2 valve output. Replace with AGC-1
7. SYMPTOM: Shot flow rate is erratic or unstable.
  - a. Check shot for cleanliness.
  - b. Check shot for cleanliness.
  - c. Check shot for cleanliness.
  - d. Check valve driver module and MagnaValve.
  - e. Call the factory for advice.

NOTE: This category is the most challenging to trouble shoot. We have found that shot cleanliness and foreign objects are usually responsible. Items, such as: wire (from identification tags), welding rod, nuts-bolts from machine or screen separator, masking tape, razor blades, milk cartons, cigarette butts, etc. seem to find their way into the MagnaValve.