

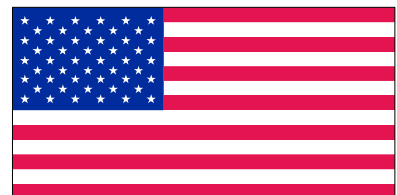
# Instruction Manual

## MAGNAVALVE FOR WHEEL BLAST MACHINE SHOT FLOW CONTROL



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*Shot Peening Control*

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Made in the USA

### 500-24xx MagnaValve

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## 1. PRODUCT DESCRIPTION

The 500-24xx Series of MagnaValves are designed to regulate the flow of steel shot or grit in abrasive blast cleaning and shot peening machines. The valves have a magnetic control section (upper portion) and a shot flow rate sensing section (lower portion). Valves are sized by flow rate capacity, either in pounds/minute or in Kg/minute, and are used in air-blast applications such as direct pressure, suction blast or gravity-fed nozzle blast machines.

MagnaValve Model	Flow Range	
	Output = 4.54 Vdc	Output = 5.00 Vdc
500-24	1200 Lbs/min	500 Kg/min
500-24B	1200 Lbs/min	500 Kg/min

*Specify calibration in pounds/minute or Kg/minute and type and size of shot with order.*

**Note:** All MagnaValves are factory calibrated to Kg/min=10 Vdc. To change to pounds/min see instruction manual for the FC-24 Controller.

## 2. THEORY OF OPERATION

MagnaValves have no moving parts, they rely upon very strong permanent magnets and cancellation electromagnets to regulate the flow rate of shot. A signal from a shot flow controller, model FC-24, will provide the appropriate control signal for flow rate. Power is supplied by an external (supplied by customer) 24Vdc source. The internal circuitry accepts a 0-10Vdc control signal and converts this to a proportional duty-cycle control of the output signal for shot flow. As the shot falls through the lower sensing portion of the valve, a 0-10Vdc signal is generated and sent back to the FC-24 controller as a flow feedback signal. This feedback signal is compared to the requested shot flow rate and the output signal is adjusted and sent back to the MagnaValve to complete the closed-loop cycle of control.

## 3. LOCATION OF ADJUSTMENTS

All of the adjustments are accessible from the front of the MagnaValve. See figure 1 for details. The factory settings should not be changed. The rated flow range is shown on the identification label. The output signal is 10 Vdc. for calibrated valves.

## 4. PRELIMINARY ADJUSTMENTS

There are no preliminary adjustments required or recommended. The valve has been tested and calibrated at the factory prior to shipment. The full-scale range of the valve and the media type and size are listed on the product label.

## 5. INSTALLATION

The MagnaValve must be mounted in a vertical position with an adequate supply of media above it.

## 6. OPERATON

Signals used to operate the MagnaValve originate at the FC-24 Controller. There are three conditions necessary for correct operation. See figure 1 for additional information.

- Power – The 24 Vdc power must be continuously applied to the valve. The valve requires 4Amps for operation and a power supply rated at 1000 VA. The voltage should be  $24 \pm 2$  Vdc.
- Enable – The 24 Vdc enable signal is used to activate the valve.

- c. Input Signal – The analog 0-10 Vdc input signal must be above 0.25 Vdc as a minimum flow command signal.

For additional information about the MagnaValve consult the FC-24 installation manual.

## 7. CALIBRATION

Calibration of the MagnaValve is done by a catch-and-weigh test. Media is allowed to flow through the valve for a timed period, usually one minute. The shot is weighed and compared to the requested amount. Adjustments are made at the MagnaValve Gain Select switches and adjustment knob. Note: Full scale output of the valve is 10 Vdc.

## 8. SPARE PARTS LIST

There are no spare parts for this series of MagnaValves

## 9. TROUBLE-SHOOTING GUIDE

The primary trouble-shooting is accomplished by reporting the status of the 4-LED indicators on the valve. They must all be ON in order for media to flow. If all of the LED's are ON but there is no media flow, check the following:

- a. Is there media available from the hopper?
- c. Is there any blockage above or below the MagnaValve or at the nozzle?
- d. Is the magnetic field completely cancelled when the red LED is ON? Check this by removing the valve from the machine and applying the proper signals for 100% flow.

## 10. MAINTENANCE

The only regular scheduled maintenance for a MagnaValve is annual re-calibration.

## 11. FRONT PANEL DESCRIPTION

The front panel of the MagnaValve contains the four LED's used for diagnostics. The large knurled screw on the front cover may be removed to gain access to the factory adjustments. Please refer all adjustments to qualified personnel. Changing the gain will affect the valve calibration accuracy and should only be done when catch-and-weigh test results are available. See figure 1 for additional information.



**Zero** – turn adjustment until both LED's are OFF. This will set the output signal to zero  $\pm$  .050 Vdc during no-flow.

**Gain** – This section controls the amplification or gain of the sensor signal. It has been factory set (see label for flow range). If the gain is changed it will be necessary to run a one minute catch and weigh test to confirm the calibration. The full scale output signal is set to 10 Vdc for kg calibration. Note: be sure only one gain switch is selected (up position). Use the "Gain Adjust" for fine adjustments.

EI also offers an exchange calibration service. Contact the factory for more information.

**Valve Pulse** – This is the rate at which the valve dispenses shot, similar to a heart beat rate. It is factory set to match the best flow characteristics of the media (cast steel, cut wire or micro-bead). Typical operation is set at 8 Hertz .

**Test Socket** – This socket provides access to diagnostic voltages.

0-10 Vdc input  
 0-10 Vdc output  
 24 Vdc "Enable" input  
 6-20 Hertz pulse rate  
 0 Vdc common

### Diagnostic LED's

**VALVE ON** – This LED is on when power is sent to the electromagnet. When the LED is off the permanent magnets will hold or block the shot flow. When the LED is on the valve is on for full capacity flow rate. When the LED is blinking then the shot flow is being regulated.

**Vin > 0.25 Vdc**- This LED indicates that an analog signal input greater than 0.25 Vdc has been received. When this LED is off there is no media flow allowed. The input signal range is 0-10 Vdc. At 10 Vdc the valve will "open" to full capacity which is usually 25% to 50% higher than the calibrated range. The relationship between the 0-10 Vdc input signal and actual flow rate is non-linear. The output signal 0-10 Vdc signal is linear and this makes accurate regulation by the FC-24 control possible.

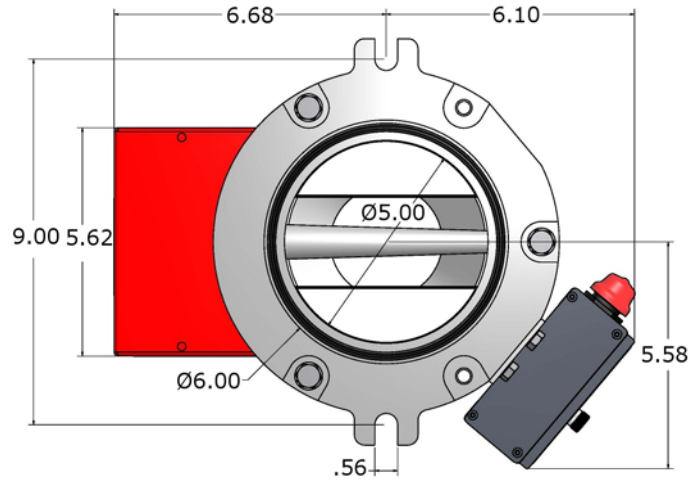
**24 Vdc ENABLE** – This LED indicates that the 24 Vdc Enable signal has been received. When this LED is off then the valve is inhibited, no shot will flow. This feature is provided as an on-off action so that you do not have to disable or remove the 0-10 Vdc input signal.

**24 Vdc Power** – This LED indicates that 24 Vdc is available to operate the electromagnets for media flow. It should always be available and able to supply 4 Amps.

**All of the LED's must be on in order to have media flow.**

## SPECIFICATIONS

<b>Input</b>	
Enable:	24Vdc
Flow Command:	0-10Vdc
Power:	24Vdc @ 4A (100VA)
<b>Adjustments</b>	
Zero, Span, Pulse Rate	
<b>Output</b>	
Flow Signal:	0-10Vdc
Accuracy:	±1% (of Full Scale)*
Flow Range:	120-1200 lb/min**
Media:	Steel or Cut wire Shot
Mode:	Normally closed
Temp Range:	40 -110 F (5 - 43 C)



**Note:** The MagnaValve is designed to operate vertically must be mounted within 5 degrees of vertical.

### FRONT VIEW COVER REMOVED

Valve ON

Vin > 25Vdc

24Vdc Enable

24Vdc Power

Pulse Rate (Factory set)

ZERO (Factory set)

SPAN (Factory set)

Laptop computer port for calibration

1. WHITE
2. RED
3. GREEN
4. ORANGE
5. BLACK
6. BLUE

## WIRE CONNECTIONS



FC-24	500-24
6. PROCESS IN 0-10V	← 1. WHITE 0-10VDC OUT
5. PROCESS 0VDC	← 3. GREEN 0VDC
8. SERVO OUT	→ 4. ORANGE 0-10VDC IN
9. VALVE ENABLE	→ 6. BLUE 24VDC ENABLE
19. 24VDC SUPPLY	← 2. RED 24VDC SUPPLY
20. 0V COMMON	← 5. BLACK 0V COMMON

**NOTE:**

- Make connection from power supply directly to the MagnaValve to prevent high current voltage drops.
- Use 16 AWG or larger wire size for connection to the controller.
- Be sure Power supply is regulated and capable of 4Amp (100VA) output.

See FC-24 Data Sheet for more information