



**500-24**



**500-24B**

## **500-24 MagnaValve®**

*for Media Flow Rate Control of Wheel-Blast Machines*

# **Instruction Manual**



**Electronics Inc.**

*Shot Peening Control*

56790 Magnetic Drive, Mishawaka, Indiana 46545 USA • 1-800-832-5653 or (574)256-5001 • [www.electronics-inc.com](http://www.electronics-inc.com)

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## Safety Notices

Good safety practices must be followed when operating and handling the MagnaValve. Improper usage could result in damage to the product or personal injury.

- Please note: The MagnaValve emits magnetic fields that can be harmful to people who wear pacemakers.
- Power off the FC-24 Controller before connecting or disconnecting the MagnaValve.

## Product Overview

The 500-24 MagnaValve® measures and regulates the flow of ferrous media in wheel-type shot peening and blast cleaning machines. This MagnaValve has a magnetic control section (upper portion) and a shot flow rate sensing section (lower portion).

## Principle of Operation

The low-maintenance construction of the MagnaValve features a rare earth permanent magnet for normally closed operation and an electromagnet for controlling shot flow rates. With power applied, the magnetic field is neutralized and shot is allowed to flow through the valve. When no power is applied to the MagnaValve, the permanent magnet stops all flow. If the power is interrupted for any reason, the permanent magnet securely holds the shot.

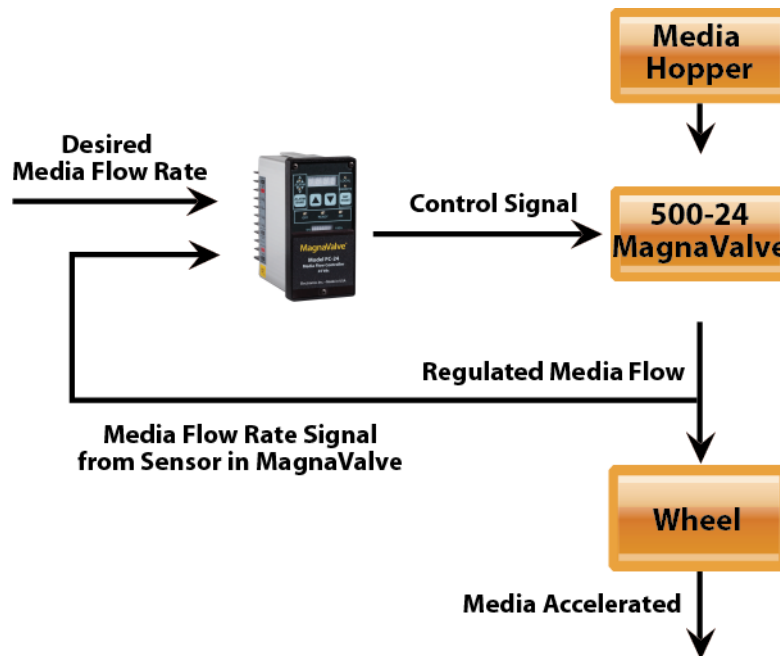
The MagnaValve is factory calibrated and results are supplied upon request.

**Note:** The MagnaValve is factory calibrated for the media type, size, and flow rate as specified on the purchase order. Refer to the calibration label on the side of the valve for this information.

# Closed-Loop Servo Control with the FC-24 Controller

To achieve closed-loop servo control, the 500-24 MagnaValve is paired with the FC-24 Media Flow Controller (sold separately). Here is how the closed-loop system provides accurate and dependable media flow control:

- The desired media flow rate signal is processed by the FC-24 Controller (0-10 Vdc)
- A control signal is sent to the MagnaValve
- The media flow rate signal is sent to the FC-24 Controller for comparison to the desired media flow rate and the control signal is adjusted as required to maintain the desired flow rate
- The alarm circuit will trigger a high-flow or low-flow alarm if the flow rate is not within the alarm bandwidth



## Features of the FC-24 Controller (sold separately)

- Monitors flow rate in lb/min and kg/min
- Enable input and output (24 Vdc)
- Remote analog setpoint (0-10 Vdc)
- Recorder analog output (0-10 Vdc)
- Digital display
- High-low alarm contacts
- Easy panel monitoring
- CE compliant
- 24 Vdc

For more information on the FC-24 Controller, please call our Customer Service department at 1-800-832-5653 (toll-free in USA and Canada) or (574) 256-5001.

# Adjustments

The valve is calibrated with the shot type and size specified on the purchase order. The valve should not need any adjustments upon installation unless a different media type or size will be used. The MagnaValve must be recalibrated if a different media type or size is used.

Several adjustments, however, can be made at the panel behind the MagnaValve's protective cover plate. These adjustments are Zero, Pulse Rate and Gain Adjust.

## Front Panel



**A) Valve Pulse** – 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.

**B) Zero** – Turn knob until both LEDs (below the (-) and (+) signs) are OFF. This will set the output signal voltage to zero  $\pm$  .050 Vdc during no-flow.

**C) Gain** – Controls the amplification or gain of the sensor signal. It has been factory set to provide a full-scale output signal of 10 Vdc for the type and size of media requested in the purchase order. (See the calibration label on the valve for flow range, media type and size.)

**Note:** Be sure only one Gain Select switch is selected (up position). Use the “Gain Adjust” knob for fine adjustments.

Gain adjustments may be required if a different type or size of media is used. Standard accuracy is 5% of full value. The MagnaValve must be recalibrated if a different media type or size is used.

**D) Test Connector** – For diagnosis by Factory or Field Service Technician.

**E) Program Port** – Connection port to a computer for calibration. A programming cable is required. For a more information on the programming cable and the calibration of a 500-24 MagnaValve, please call our Customer Service department at 1-800-832-5653 (toll-free in USA and Canada) or (574) 256-5001.

# LED Status Indicators

Front Panel



## 1) VALVE ON – Green LED indicates the valve flow status

- OFF = No flow
- ON = The valve is opened to full capacity and the media is allowed to flow
- Blinking = The valve is pulsing and dispensing the amount of shot flow as determined by the FC-24 Controller

## 2) Vin > 0.25 Vdc – Amber LED indicates the status of the servo input analog signal

- ON = Servo signal exceeds the 0.25 Vdc threshold and media will flow
- OFF = Servo signal is less than the required 0.25 Vdc threshold signal and no media will flow

## 3) 24 Vdc ENABLE – Amber LED indicates the operating status

- ON = Valve is enabled and media will flow
- OFF = The valve is not enabled and no media is allowed to flow

## 4) 24 Vdc Power – Red/Green LEDs indicate the status of 24 Vdc power

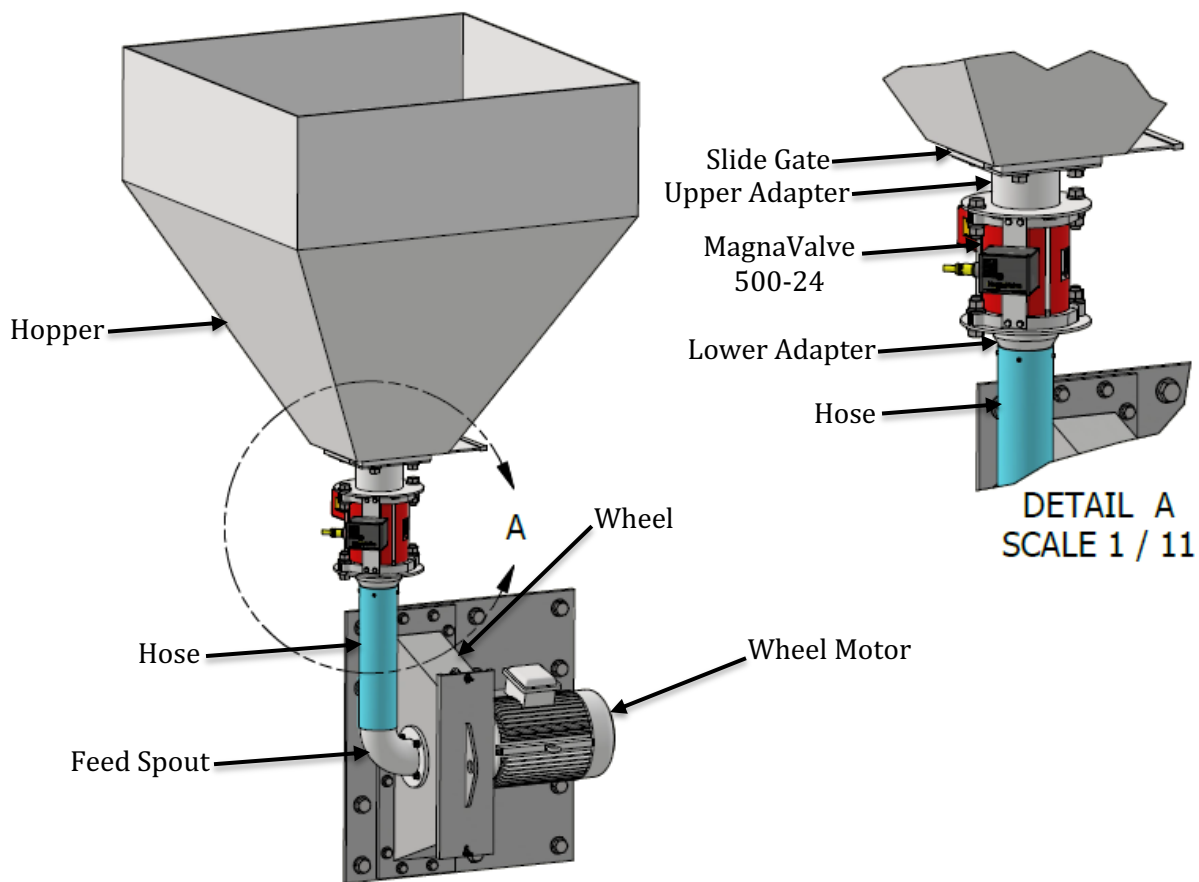
- OFF = No 24 Vdc power is available
- Red ON = 24 Vdc power is available (within tolerance)
- Red Blinking = Power is available but not within the tolerance band  $\pm 2$  Vdc
- Green ON = Microprocessor failure - return valve to Electronics Incorporated for service

# Installation

## Overview

To ensure proper operation and the long life of the MagnaValve®, proper installation is important. The images below show an example of the recommended installation of the 500-24 and 500-24B and describe the individual parts that are typically found on a peening/blasting machine. The following sections provide details of the proper installation of the MagnaValve.

**Slide Gate/Maintenance Valve:** The slide gate or maintenance valve is located above the MagnaValve. The maintenance valve allows for the removal of the MagnaValve without draining the shot from the hopper.



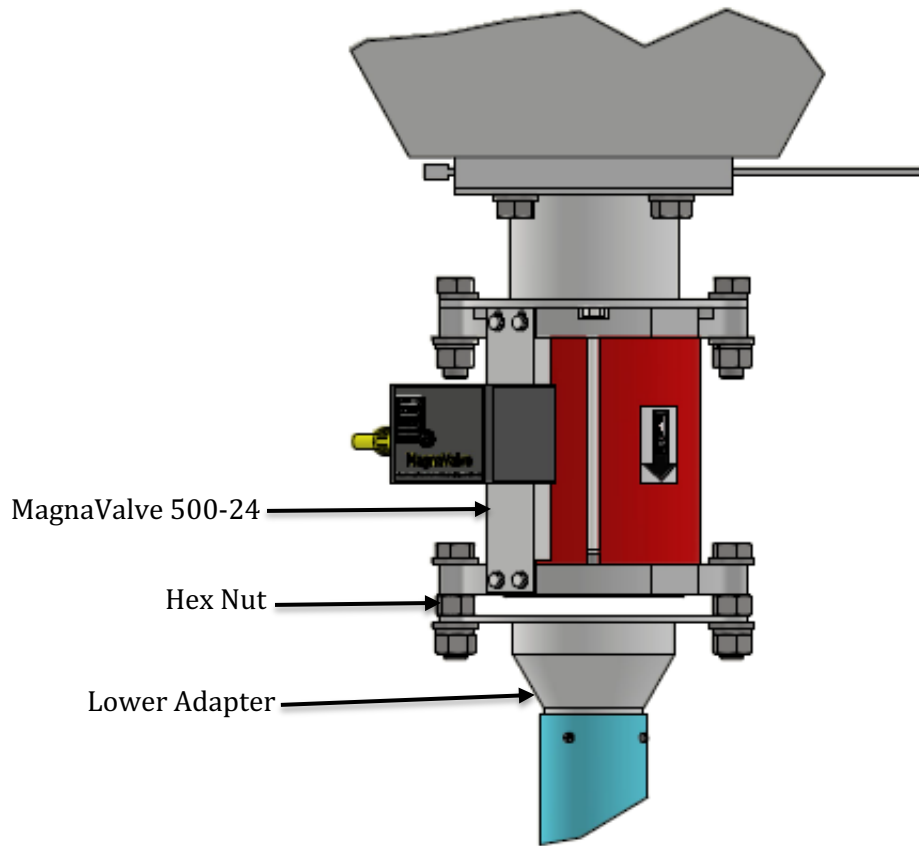
**Upper Adapter:** The upper adapter attaches the MagnaValve to the slide gate so the MagnaValve can be removed without removing the Slide Gate.

**Lower Adapter:** The lower adapter adapts the MagnaValve output to the hose that connects the MagnaValve to the feed spout.

# Air Aspiration

An air aspiration inlet below the valve is required for proper operation. Three examples of this follow:

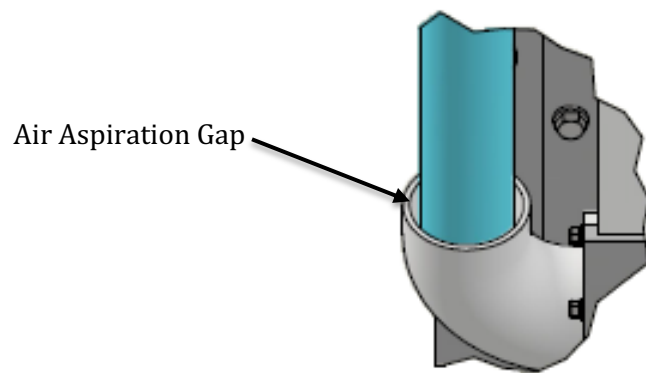
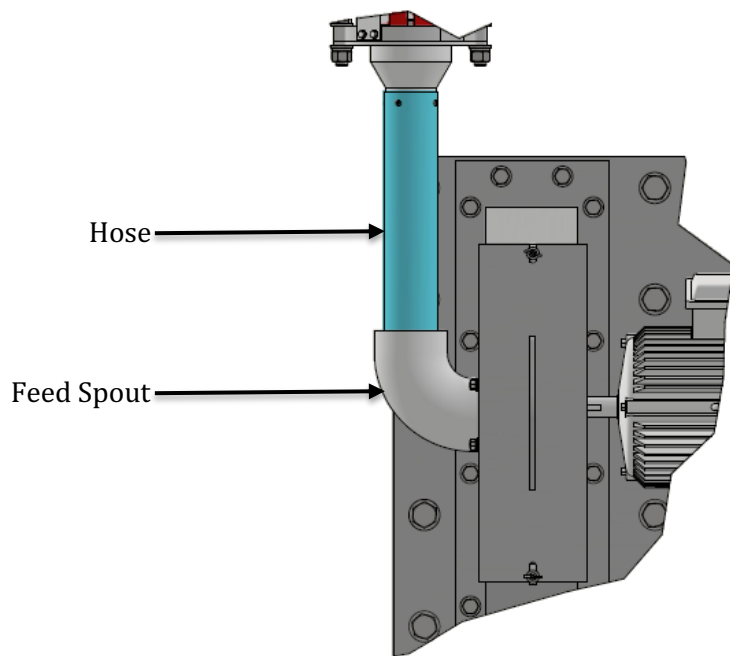
1. A gap below the MagnaValve  
Create a gap between the MagnaValve and the lower adapter. The gap can be created by placing shim, washers, or nuts between the MagnaValve and the lower adapter.





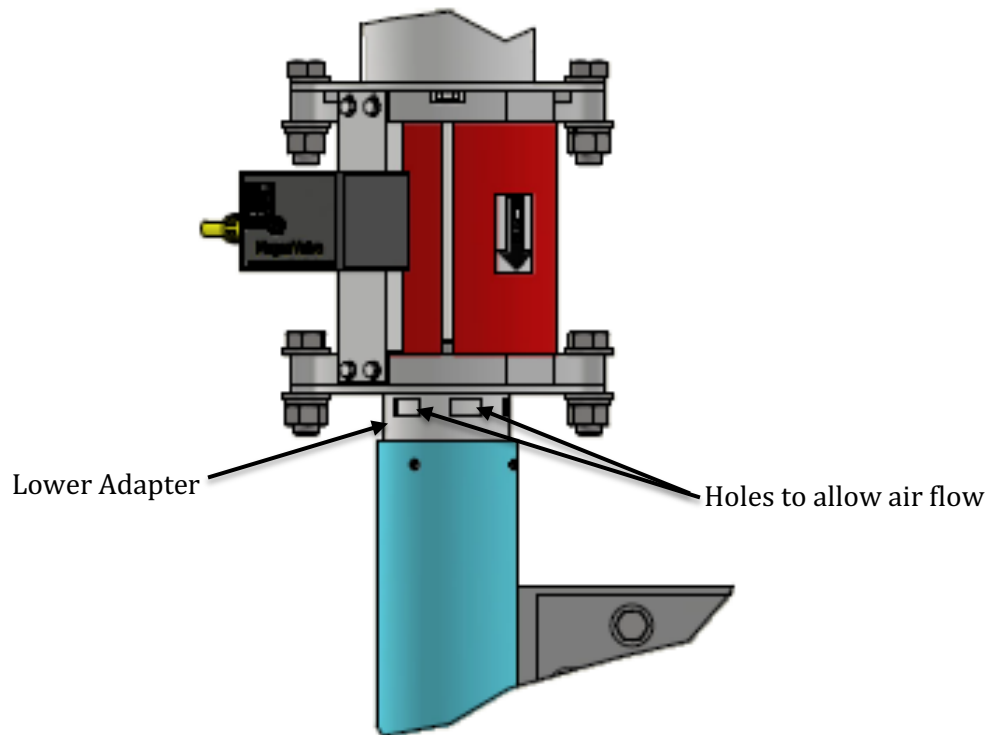
## 2. Feed Spout Modification

Create a gap for air to enter the system at the feed spout. Using a feed spout larger than the hose will create a gap between the hose and the feed spout, allowing air to enter.



3. Lower Adapter Modification

Add air inlet holes or slots in the lower adapter. Drilling holes or machining slots or cutouts into the lower adapter will allow air to enter the system.



# Wiring Diagrams

The following pages illustrate the wiring diagrams for the 24 Vdc MagnaValves. Routing of ground wires from the MagnaValve back to the power supply will prevent interference from the high current pulses that can place disturbances on the ground wires (see Figure 2 on the next page).

- Figure 1 illustrates the routing of signal wires between the FC-24 Controller and the MagnaValve that is acceptable for most applications
- Figure 2 illustrates the preferred routing of signal wires between the FC-24 Controller and MagnaValve

For more information, download the FC-24 Controller Installation Manual at [www.electronics-inc.com](http://www.electronics-inc.com).

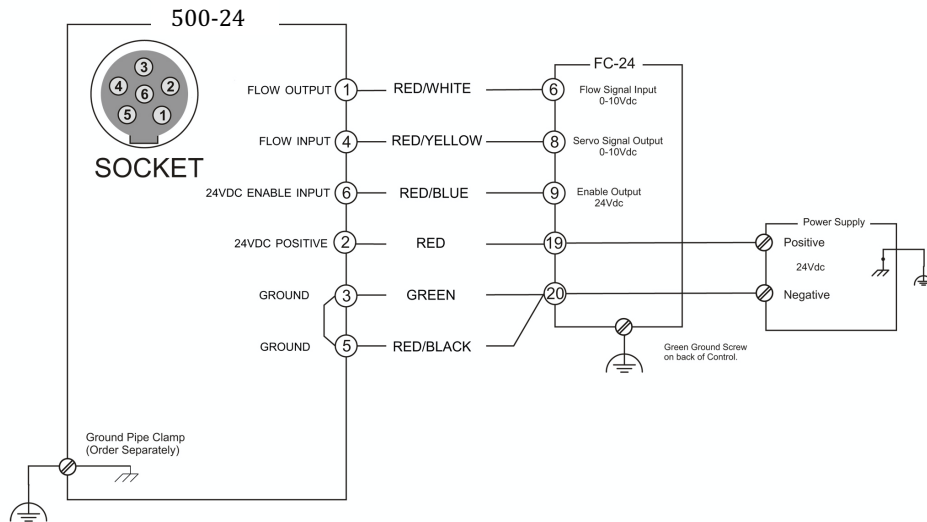
## Grounding Notes

The FC-24 Controller chassis green screw on back must be connected to a good earth ground. The MagnaValve must be grounded, by ensuring the mounting flange has a path to a good earth ground.

**Note:** The 24 Vdc power supply must be capable of supplying 2 Amps to each valve. The black (ground) wire from the MagnaValve must be routed directly to the negative lead (ground) of the power supply. Each valve must have a separate wire to this negative terminal. Do not daisy-chain valve ground commons.

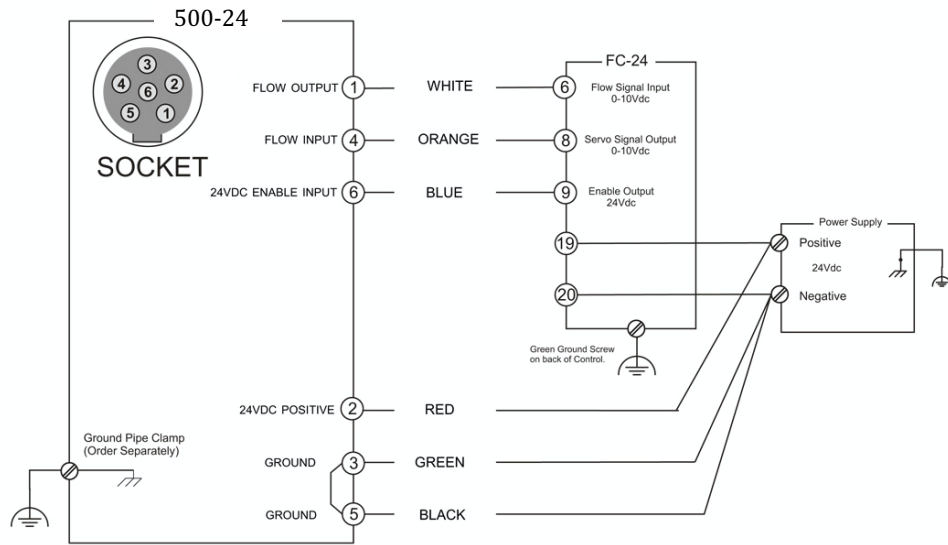
**Figure 1. MagnaValve and FC-24 Controller Wiring**

Acceptable for most applications



## Figure 2. MagnaValve and FC-24 Controller Wiring

Preferred for noise immunity and ground-loop issues



A 6-ft. long conductor cable and 6-pin plug are supplied with each MagnaValve. The cable should be run in a private metal conduit with no other wires to prevent noise interference. If additional wire length is needed, the wire should be a minimum of 16 AWG. Contact Electronics Inc. for alternate lengths.

**For higher electrical noise immunity, do not connect the MagnaValve ground wires to the FC-24 Controller terminals.** The Green and Black wires must be taken directly to the negative terminal of the power supply or to a copper bus bar connected directly to the negative terminal of the power supply. These wires conduct high current pulses that may interfere with the flow rate signal or the servo command signals.

## Calibration

An annual calibration of the 500-24 MagnaValve is recommended. The annual calibration should be based on the first date of use, not the factory date of calibration on the MagnaValve's calibration label.

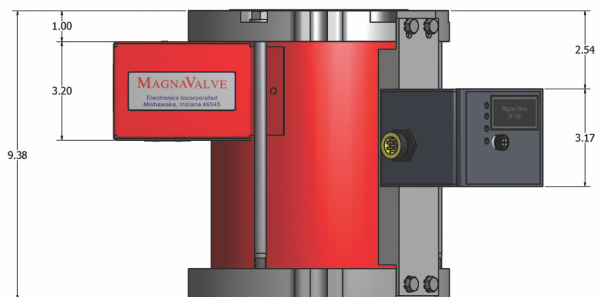
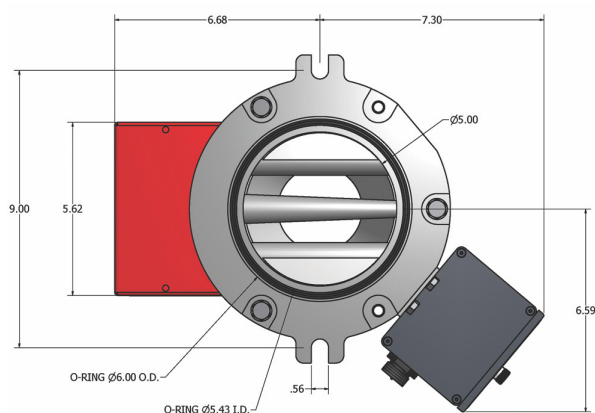
Detailed instructions on how to calibrate a 500-24 MagnaValve are available in our "Calibration Instruction Manual for the 24 Vdc MagnaValve®." The manual is available for download from our website at [www.electronics-inc.com](http://www.electronics-inc.com).

## Specifications

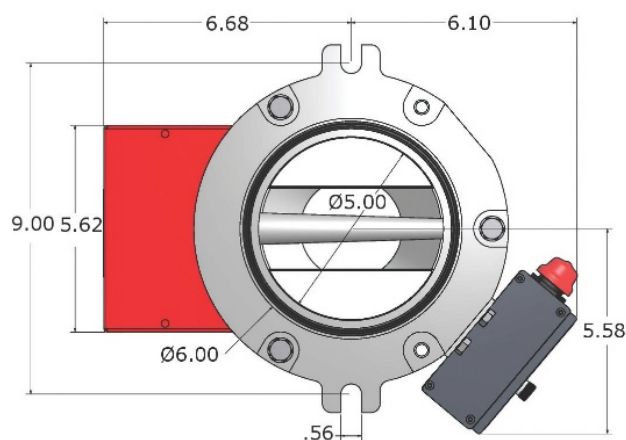
Power	+24Vdc @ 2A (50VA)
Media	All ferrous media except Cast Stainless Steel
Mode	Normally Closed
Temperature Range	40°F - 110°F (5°C - 43°C)
Servo Command Input	0-10 Vdc
Flow Enable Input	24 Vdc
Flow Sensor Output	0-10 Vdc, max output 11.5 Vdc

## Product Dimensions

### 500-24



### 500-24B



# Troubleshooting Guide

***If all of the LEDs are on but there is no media flow, please check the following:***

1. Is the mechanical valve above the MagnaValve fully open?
2. Is media available from the hopper?
3. Is there a blockage above or below the MagnaValve?
4. Is aspiration air available below the MagnaValve?
5. Is the magnetic field completely canceled when the Green "Valve On" LED is on? Check this by removing the valve from the machine and applying the proper signals for 100% flow. Did all of the shot fall from the valve?"

***If the problem can't be identified, contact Electronics Inc. Please have the following information ready.***

1. Type of system: \_\_\_ Fixed or \_\_\_ Variable Wheel size: \_\_\_\_\_ Speed/RPM: \_\_\_\_\_ Horsepower: \_\_\_\_\_
2. Number of valves on the machine: \_\_\_\_\_
3. Controller mode: \_\_\_ FC-24 \_\_\_ PLC \_\_\_ Other: \_\_\_\_\_
4. Valve serial number: \_\_\_\_\_
5. Media type: \_\_\_ Cast Steel \_\_\_ Cut Wire \_\_\_ Grit \_\_\_ Other: \_\_\_\_\_
6. Media size: \_\_\_\_\_
7. Desired flow rate (lb/min or kg/min): \_\_\_\_\_
8. Is there a shut-off maintenance valve rated 150% of expected flow rate above the MagnaValve?
9. Number of valves on one 24 V power supply: \_\_\_\_\_

## ***Make note of LED indicators on the MagnaValve:***

1. How do the MagnaValve LED indicators react during the blast cycle?
2. Make note of LED indicators on the FC-24 Controller (if used).
3. Does the FC-24 Controller display "0" (zero) at the end of the blast cycle?

To expedite a solution, please send images of your valve installation, the valve's Calibration Label and/or a video of the controller and valve driver during operation.

Telephone: (574) 256-5001 or 1-800-832-5653 (USA and Canada) Fax: (574) 256-5222

## **Replacement Parts**

There are no user serviceable parts.

## **Maintenance**

An annual calibration is recommended for the 500-24 MagnaValve.

## **Contacting Electronics Inc.**

Mailing and Shipping Address:

Electronics Inc.

56790 Magnetic Drive

Mishawaka, IN 46545 USA

Telephone: 1-800-832-5653 (Toll-free in USA and Canada) or (574) 256-5001

Fax: (574) 256-5222

Email: [sales@electronics-inc.com](mailto:sales@electronics-inc.com)

Website: [www.electronics-inc.com](http://www.electronics-inc.com)

# Limited Warranty

## 500-24 MagnaValve®

The warranty obligations of Electronics Inc. for this product are limited to the terms set forth below.

### Length of Warranty Period

This limited warranty lasts one (1) year from the shipping date of this product.

### What is Covered

This limited warranty covers defects in materials and workmanship in this product.

### What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance or use of a media for which the MagnaValve was not calibrated, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Electronics Inc. to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover equipment enclosures, cables or accessories used in conjunction with this product.

### How to Obtain a Remedy Under this Limited Warranty

To obtain a remedy under this limited warranty, contact Electronics Incorporated by letter, email, fax or telephone with the following information:

- Product name and model
- Product serial number
- Original shipping date (see label on product)
- Company name and location
- Name of contact person for description of symptoms
- Return shipping address and any special instructions

If it is determined that the product must be returned under this limited warranty, a Returned Goods (RG) number, obtained from Electronics Inc., will be required. This product should be properly packed to prevent damage in transit. Cartons not bearing a RG number will require additional processing time and repair service may be delayed.

### What Electronics Inc. Will Do Under This Limited Warranty

Electronics Inc. will, at its sole discretion, provide one of the following remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable time period, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Electronics Inc. will pay the shipping costs necessary to return this product once the repair is complete.



2. If the defective product cannot be repaired, it will be replaced with a new unit and the original warranty period will be extended by six (6) months. Electronics Inc. will pay the shipping costs necessary to replace this product.

If this product is returned to Electronics Inc., the product must be insured during shipment, with the insurance and shipping charges prepaid. If this product is returned uninsured, Electronics Inc. does not assume any risk of loss or damage during shipment. Electronics Inc. will not be responsible for any costs related to the removal or re-installation of this product.

#### **Out-of-Warranty Product**

Product that is out-of-warranty will be repaired at customer's request and the cost of repair will be disclosed prior to proceeding with the repair. A purchase order must be received prior to repair. If the product cannot be repaired, Electronics Inc. will provide one of the following remedies:

- 1) New unit at current pricing with a one (1) year Limited Warranty from the shipping date of product.
- 2) Refurbished unit (if available) at a discounted price with a six (6) month Limited Warranty from the shipping date of product.

#### **Limitation on Liability**

The maximum liability of Electronics Inc. under this limited warranty shall not exceed the actual purchase price paid for the product. Electronics Inc. is not responsible for direct, special, incidental or consequential damages resulting from any breach of warranty or condition, or under any other legal theory to the maximum extent permitted by law.

#### **Exclusive Remedy**

To the maximum extent permitted by law, this limited warranty and the remedies set forth above are exclusive and in lieu of all other warranties, remedies and conditions, whether oral or written, express or implied. To the maximum extent permitted by law, Electronics Inc. specifically disclaims any and all implied warranties, including, without limitation, warranties of merchantability and fitness for a particular purpose. If Electronics Inc. cannot lawfully disclaim or exclude implied warranties under applicable law, then all implied warranties covering this product, including warranties of merchantability and fitness for a particular purpose, shall apply to this product as provided under applicable law.

#### **Rights Under State Law**

This warranty defines specific legal rights relative to these products provided by Electronics Inc. Legal rights may also vary from state to state.