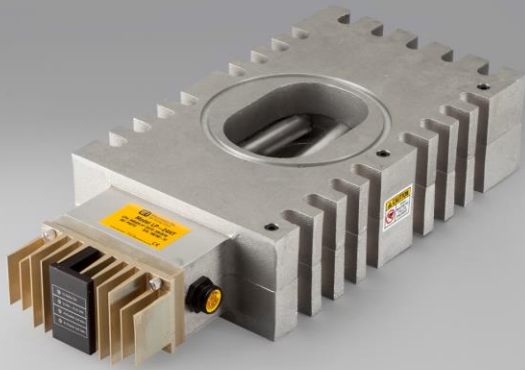




LP-24



VLP-24 and VLP-24 Jr



LP-24HT



VLP-24HT

LP-24, VLP-24 and VLP-24 Jr LP-24HT and VLP-24 HT MagnaValve® 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

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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 AC-24 Controller before connecting or disconnecting the MagnaValve.

Additional safety notices can be found throughout this manual and should be adhered to at all times.

MagnaValve® Overview

The VLP-24 and LP-24 MagnaValves, regulate the flow of ferrous media in shot peening and abrasive blast cleaning machines where the wheel motor amperage is used as the controlling parameter. These valves have a magnetic control section and an electromagnet section for flow rate regulation. These valves are typically used with either manual control (Pot-24) or closed-loop control (Model AC-24). The VLP-24 and LP-24 MagnaValves have no moving parts, making them low-maintenance valves.

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.

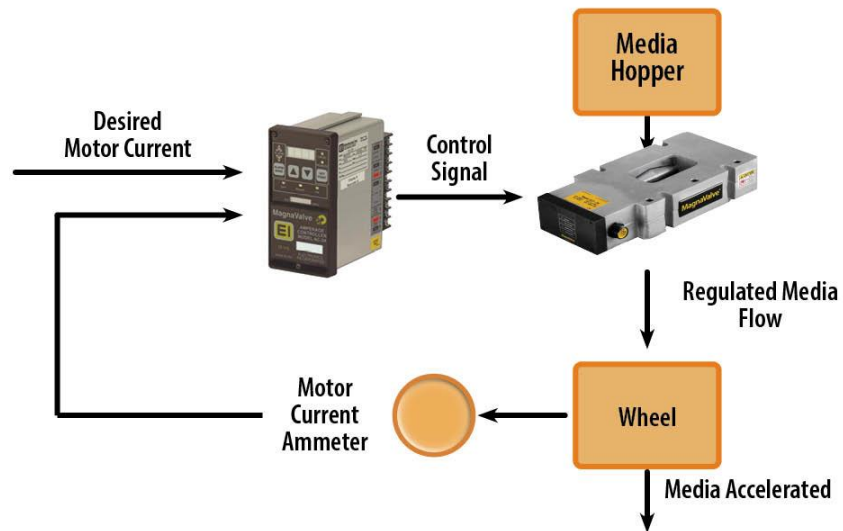
The MagnaValve is factory calibrated and results are supplied upon request.

Note: *The MagnaValve is factory tested using manual control in the open loop mode. A 0-10 Vdc signal is applied to the valve, and the resulting flow rate is recorded and depicted on the calibration graph.*

MagnaValve® Closed-Loop Operation with Model AC-24

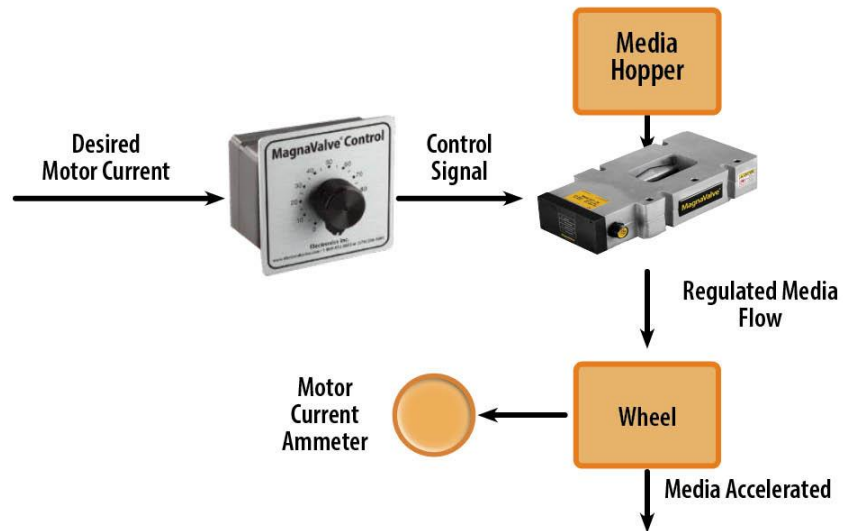
To achieve closed-loop servo control, the VLP-24 and LP-24 MagnaValves are paired with the AC-24 Controller (sold separately). Here is how the closed-loop system provides accurate and dependable media flow control:

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



MagnaValve® Open-Loop Operation with Model Pot-24

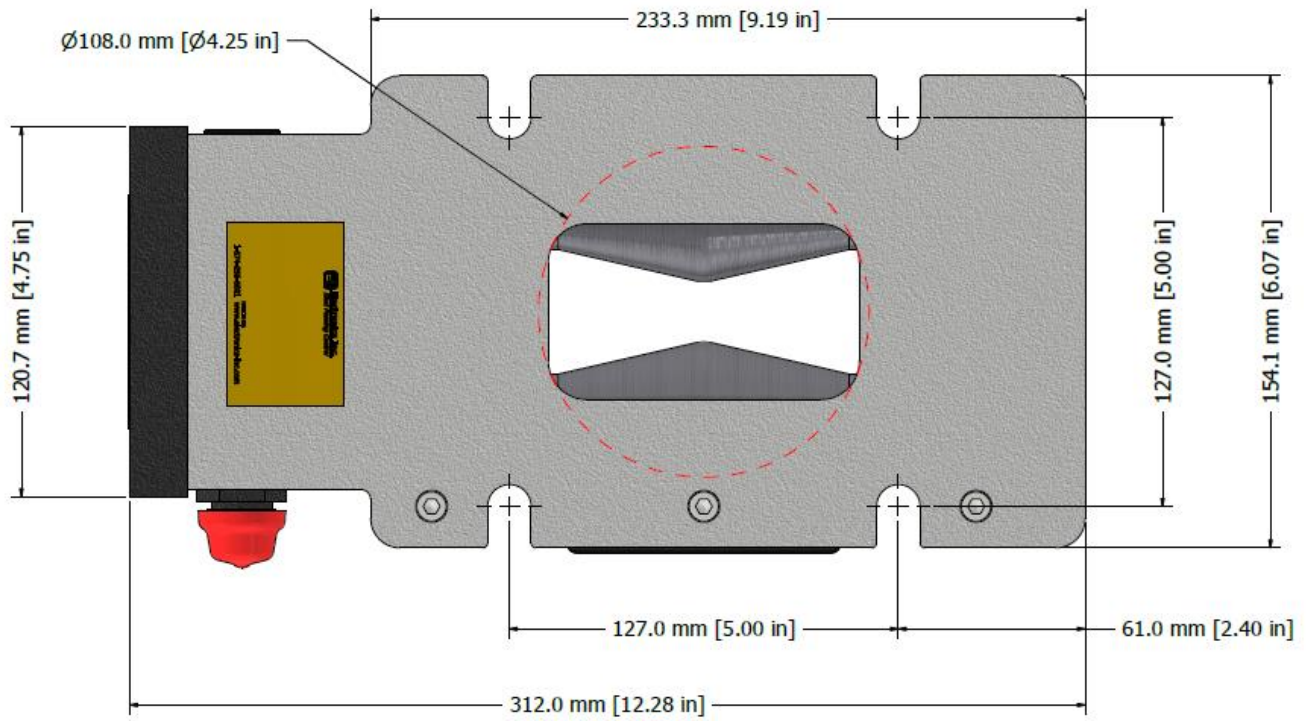
Model Pot-24 Control (sold separately) is used for manual open-loop applications on a wheel blast machine. A setpoint knob is available for the operator to select from 0-100% media flow rate. A setpoint limit adjustment is available on the rear of the control to restrict operation within the motor's Horsepower and current range. The operator must monitor the wheel motor amperage manually, since there is no feedback available.

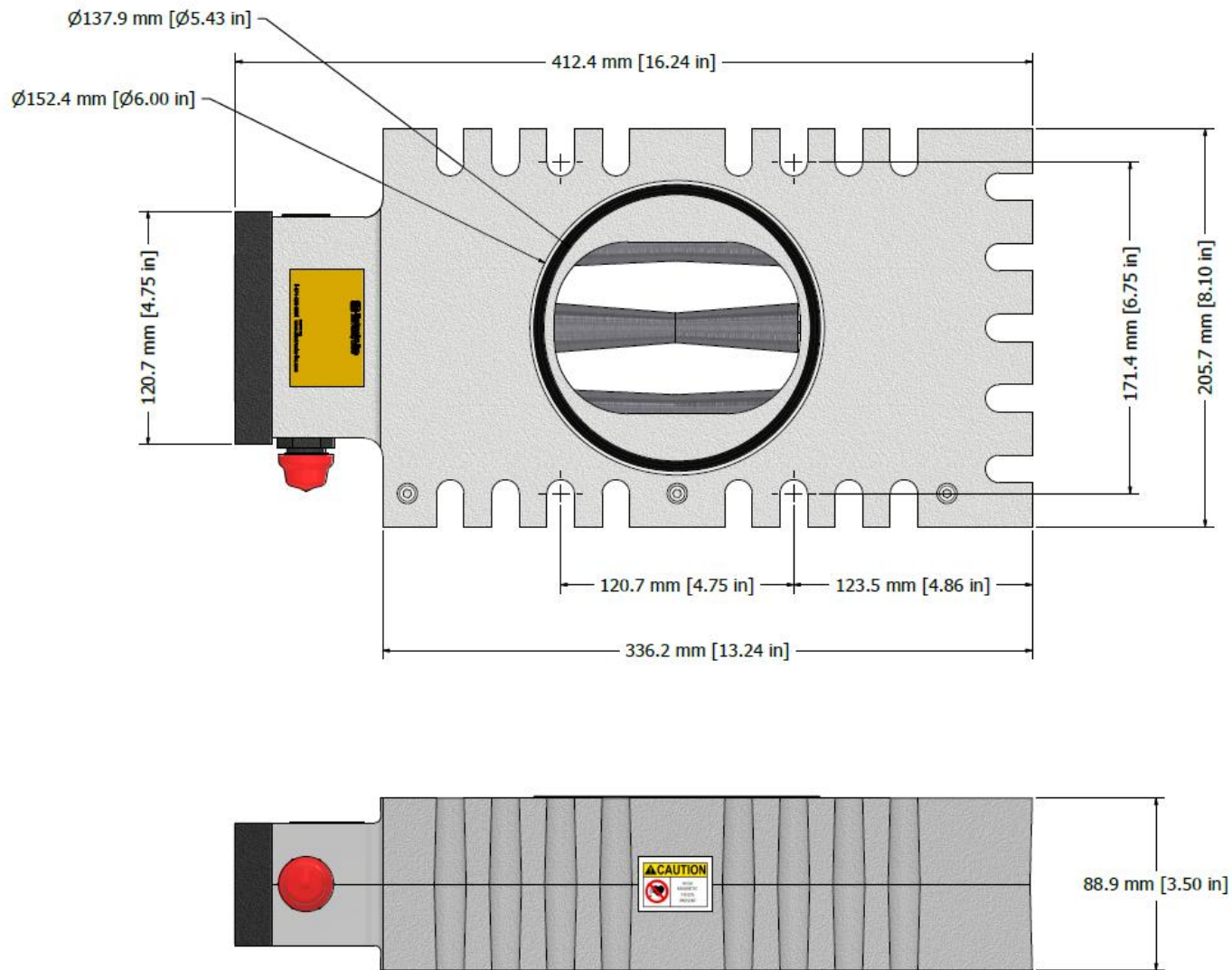


MagnaValve® Specifications and Product Dimensions

Power	24 Vdc @ 2A ±2Vdc
Media ¹	Steel Shot and Grit
Mode	Normally Closed
Flow Output ² VLP-24 JR VLP-24 LP-24	40 – 400 lb/min (18 – 181 kg/min) 200 – 1000 lb/min (45 – 453 kg/min) 400 – 2000 lb/min (90 – 907 kg/min)
Temperature Range LP-24/VLP-24 LP-24HT/VLP-24HT	32° – 67°F (0° – 75°C) 32° – 200°F (0° – 93°C)
Weight VLP-24/VLP-24HT LP-24/LP-24HT	15 lb / 6.8 kg 30 lb / 13.6 Kg
Servo Command Input	0-10 Vdc

1. Media- Do not use cast stainless steel shot since it is not magnetic. Stainless steel **cut wire** media may be used but consult the factory for assistance.
2. Factory testing is conducted with S-230 Cast Steel Shot. Larger media sizes will reduce the maximum flow rate.





MagnaValve® Installation Check List

Mounting

- ✓ All plumbing above and below the MagnaValve® is capable of 150% of the maximum flow rate of the installed MagnaValve.
- ✓ The hole ID in the hopper matches the slide gate and/or plumbing ID.
- ✓ A maintenance valve/slide gate is installed above the MagnaValve and fully open or closed.
- ✓ There is no partial blockage in or above the MagnaValve that is restricting media flow through the MagnaValve.
- ✓ The plumbing a minimum of six (6) inches above and below the MagnaValve, is straight and not entering at an angle.
- ✓ The MagnaValve is less than 36 inches above the feed spout.

Electrical

- ✓ All wired connections are routed away from any high voltage and high current carrying conductors.
- ✓ The 24V power supply is rated for 2 amps per MagnaValve plus any other attached load.
- ✓ The yellow quick release cable is fully plugged into the MagnaValve and secured with the locking nut.

MagnaValve®, AC-24 Operation Quick Start

Flowing Media Using an AC-24 Controller

This section describes the basic operation of the MagnaValve when wired to an AC-24 Controller.

AC-24 Settings:

- On/Off/Ready – Ready
- Servo – On
- Setpoint, Local/Remote – Remote (if using PLC to control the Setpoint)

Use the following steps to start and control media flow from a PLC using the AC-24 Controller:

1. Apply 24 Vdc supply to the AC-24 Controller and the MagnaValve.
2. Apply the Analog Input Signal (0-10 Vdc) to the Remote Setpoint on the AC-24.

Note: The Flow Limit is the maximum flow rate at which the MagnaValve can flow. The VLP-24 will flow approximately 1000 lb/min based on material and shot size. The LP-24 will flow approximately 2000 lb/min based on material and shot size.

3. Apply 24 Vdc to the Enable Input on the AC-24 to start flow.
4. Apply 0 Vdc to the Enable Input to stop flow.

MagnaValve[®], POT-24 Operation Quick Start

Flowing Media Using a POT-24 Controller

This section describes the basic operation of the MagnaValve when wired to a POT-24 Controller.

Use the following steps to start and control media flow from a POT-24 Controller:

1. Apply 24 Vdc supply to the POT-24 Controller and the MagnaValve.
2. Turn the knob on the POT-24 to the desired setting.

Note: The Output Limit located on the back of the POT-24 can be set to limit the maximum flow rate at which the MagnaValve can flow. The VLP-24 will flow approximately 1000 lb/min based on material and shot size. The LP-24 will flow approximately 2000 lb/min based on material and shot size.

3. Apply 24 Vdc to the Enable Input on the POT-24 and MagnaValve to start flow.
4. Apply 0 Vdc to the Enable Input to stop flow.

MagnaValve® Mounting Installation

Overview

Proper installation of the MagnaValve® is essential for reliable operation and long service life. Figures 1 and 2 illustrate recommended mounting configurations for the LP-24, VLP-24, and VLP-24 Jr MagnaValves and identify common components used in shot peening and blasting machines.

Components

- **Slide Gate / Maintenance Valve**
Installed between the hopper and the MagnaValve, the slide gate allows removal of the MagnaValve without emptying the hopper.
- **Upper Adaptor**
Connects the slide gate to the MagnaValve so the valve can be removed while leaving the slide gate installed.
- **MagnaValve (LP-24 / VLP-24 / VLP-24 Jr)**
A magnetic flow-control valve that regulates steel shot or grit for closed-loop controlled blast processes.
- **Lower Adaptor**
Connects the MagnaValve outlet to the feed hose leading to the wheel's feed spout.

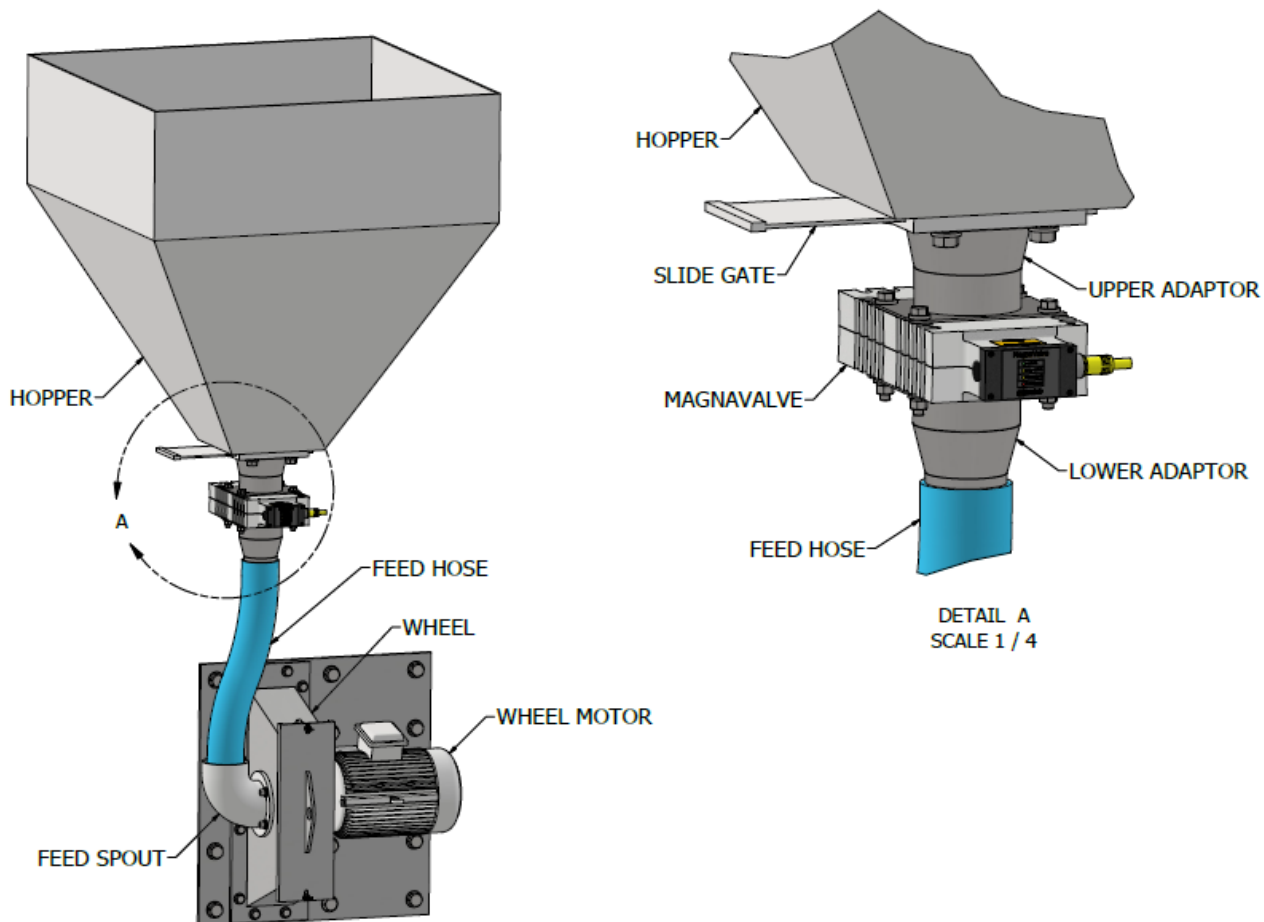


Figure 1: MagnaValve mounted at the hopper with feed hose to the feed spout. The upper adaptor is shown between the slide gate and the MagnaValve.

MagnaValve® Installation Requirements

- Install the MagnaValve **horizontally** between the upper and lower adaptors.
- Mount the MagnaValve within **36 in (1 m)** of the wheel's feed spout to minimize **transport lag**.
 - *Transport lag* is the delay between a change at the valve and when the feedback system detects the resulting flow change. Excessive lag reduces closed-loop stability.
- Ensure the **O-ring on the top of the valve is fully seated** against the adaptor surface.
 - **Do not allow gaps**—air and media leakage will occur if the seal is incomplete.

IMPORTANT: A proper O-ring seal ensures consistent media flow and prevents premature valve wear.

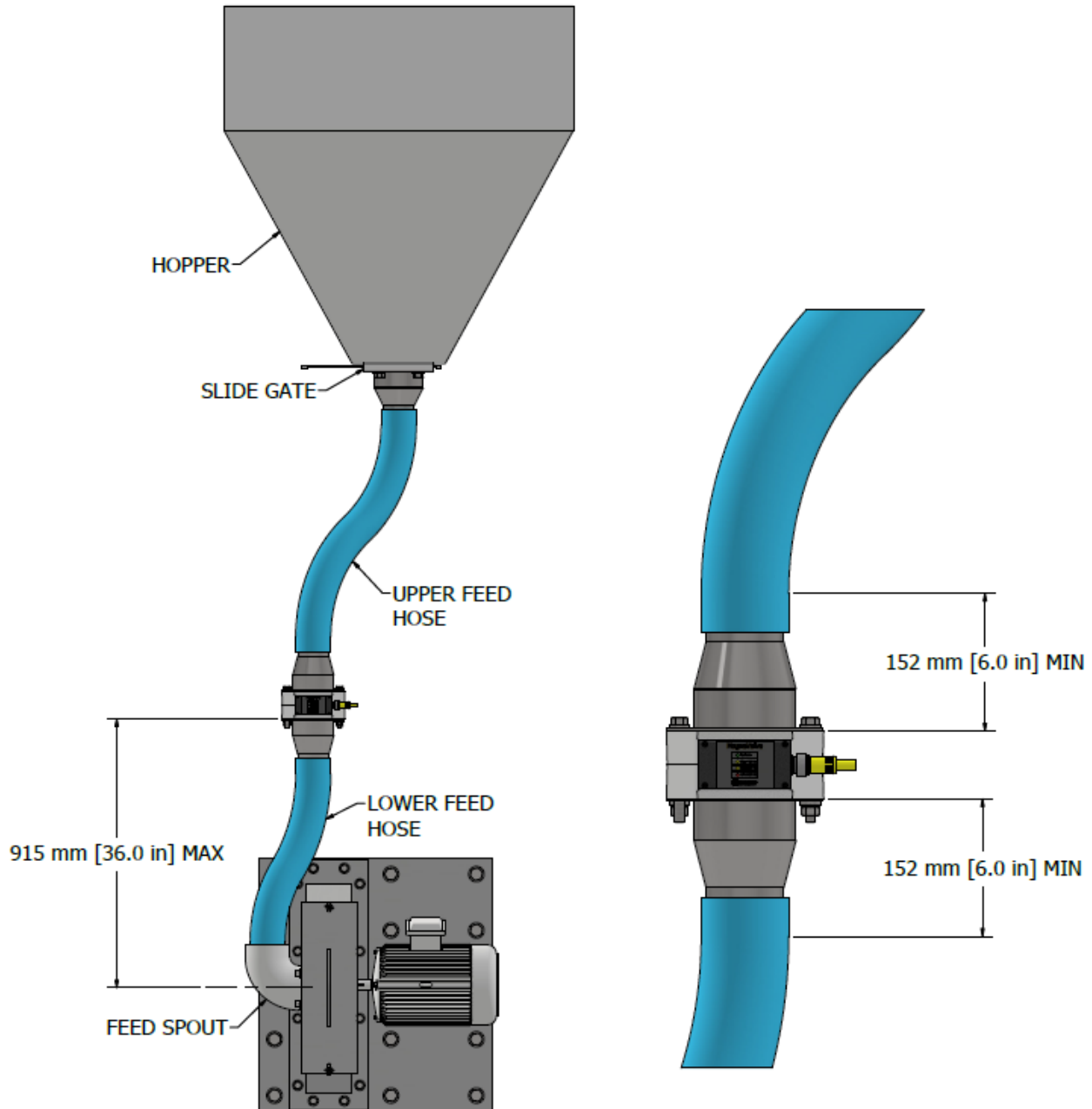


Figure 2: MagnaValve installed between the hopper and the wheel. Illustration shows the required 1 m (36 in) max distance to the feed spout and minimum 6 in of straight plumbing above and below the valve.

MagnaValve® Media Supply

Supplying the MagnaValve with an adequate amount of media is essential to maintain accurate flow control and prevent damage.

Required Media Supply

The MagnaValve must always receive **more media than its full-flow rating**:

- **VLP-24 Jr:** supply > 400 lb/min
- **VLP-24:** supply > 1000 lb/min
- **LP-24:** supply > 2000 lb/min

Even if the process requires a low maximum flow (e.g., 400 lb/min), the upstream media supply must exceed the values above. A full supply forms a **solid stacked media column** that protects the internal pole pieces.

CAUTION:

Operating with insufficient media supply allows high-velocity shot to strike the pole pieces directly, causing erosion and premature failure.

Slide Gate Position

To avoid restricting the media supply:

- The slide gate must be either:
 - **Fully Open** (normal operation)
 - **Fully Closed** (maintenance only)

A partially open slide gate will starve the MagnaValve, breaking the protective media column and increasing wear.

IMPORTANT:

Always operate with the slide gate **fully open** during blasting operations.

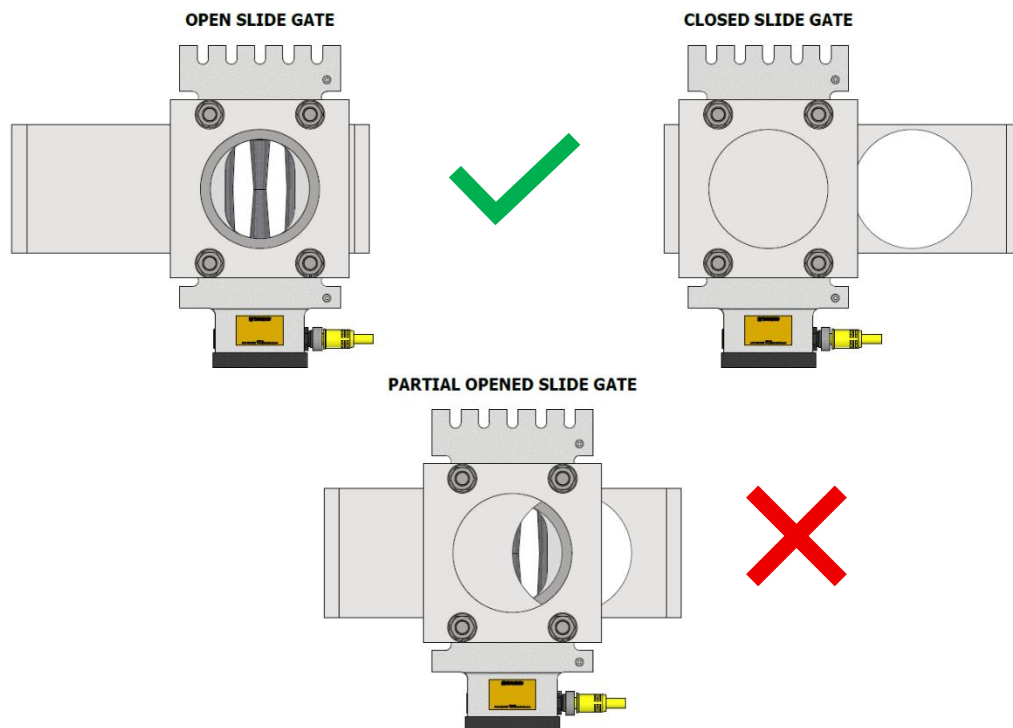


Figure 3: Examples of slide gate conditions: fully open, fully closed, and partially open (restricted).

Effects of Media Starvation

A starved MagnaValve®:

- Cannot maintain a protective column of media
- Exposes the pole pieces to direct impact
- Causes rapid internal erosion
- Leads to inconsistent flow control and unstable closed-loop performance



Figure 4: Severe erosion on pole pieces and casting resulting from prolonged media starvation.

Air Aspiration

During wheel-only operation (wheel spinning with no media flow), the wheel blades generate a low-pressure region beneath the MagnaValve®. If pressure is not equalized, media may be unintentionally pulled through the valve.

Purpose of Air Aspiration

When the wheel is running but the MagnaValve is closed:

- A large pressure differential may develop across the valve
- The magnetic field may not hold all media in place
- Air and media can be drawn downward unintentionally

Introducing air below the MagnaValve during the “off” condition prevents this.

IMPORTANT:

LP-24 and VLP-24 valves **do not include built-in air aspiration**. It must be provided by the machine’s installation.

Methods of Creating Air Aspiration

Several common installation techniques are used to introduce controlled airflow:

1. **Gap Between MagnaValve and Lower Adaptor**
A small, intentional gap created using washers or additional nuts allows air to enter beneath the valve. See Figure 5.
2. **Drilled Vent Holes in Hose Adaptor**
Small holes drilled into the hose Adaptor below the MagnaValve provide a direct air path while minimizing media loss. See Figure 6.
3. **Oversized Feed Spout Opening**
Using a feed spout with a larger ID than the hose OD creates an annular air gap beneath the valve. See Figure 7.

NOTE:

The aspiration path must allow **air to enter** but should **not allow media to escape**. Proper sizing and placement are essential.

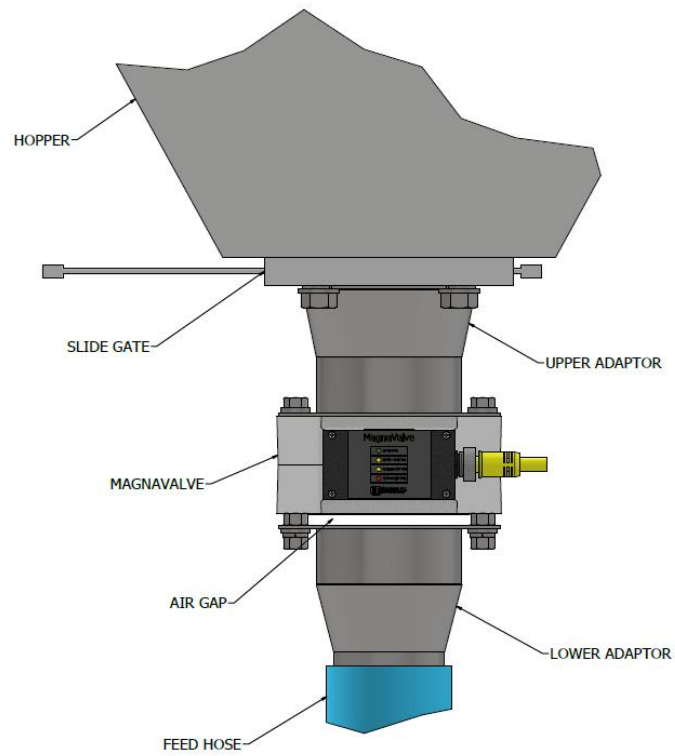


Figure 5: Air aspiration created by spacing the lower adaptor away from the MagnaValve using washers or nuts.

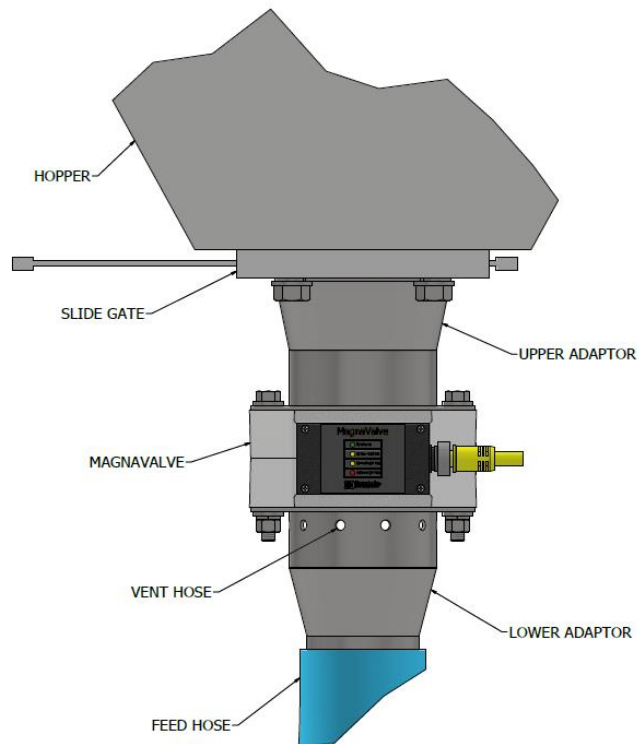


Figure 6: Air aspiration created using drilled vent holes in the hose adaptor beneath the MagnaValve.

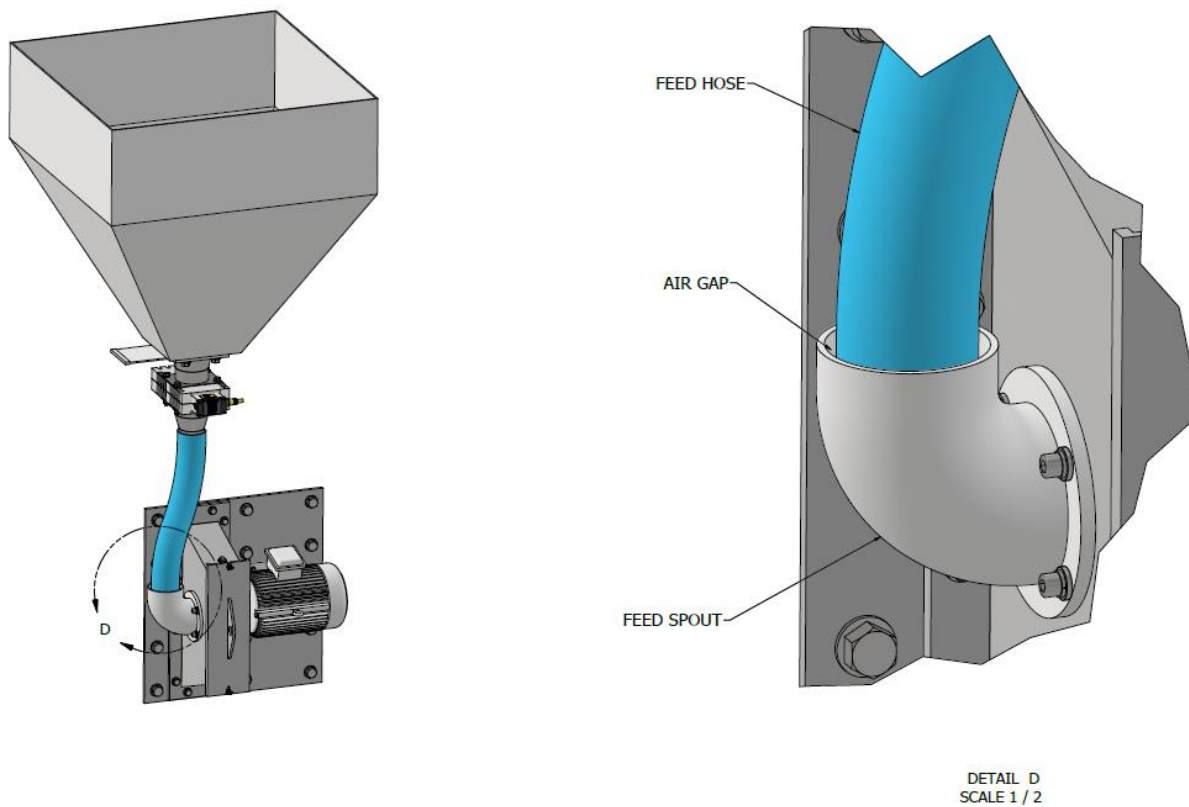


Figure 7: Air aspiration created by a smaller hose inserted into a larger feed spout, leaving an annular gap.

Electrical

Wiring

Power Supply per MagnaValve®

Parameter	Value	Tolerance
Voltage	24 Vdc	±10 %
Current	2 Adc per connected valve	1.75 Adc min

The 24 Vdc Supply Input consists of two wires on the connector: the Supply Input (RED wire), and the Signal Common (BLACK wire). The Supply Input and the Signal Common provide power to the MagnaValve. It is requested that the customer provide a DC supply capable of 2.0 amps of current for each MagnaValve connected to the supply. The MagnaValve, when flowing 100%, typically has a current draw of 0.8 A to 1.3 A. The requested 2.0 A supply is necessary to handle surge currents while the MagnaValve is pulsing.

Enable Input Requirements

Parameter	Value	Tolerance
Voltage	24 Vdc	14.7 V to 30.0 V
HIGH IN	Flow Media	14.7 V to 30.0 V
LOW IN	NO Flow Media	0.0 V to 5.9 V

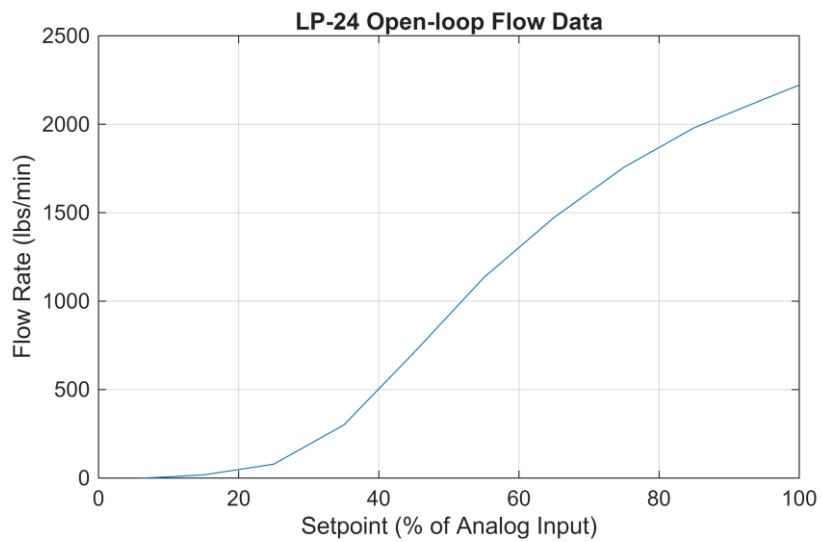
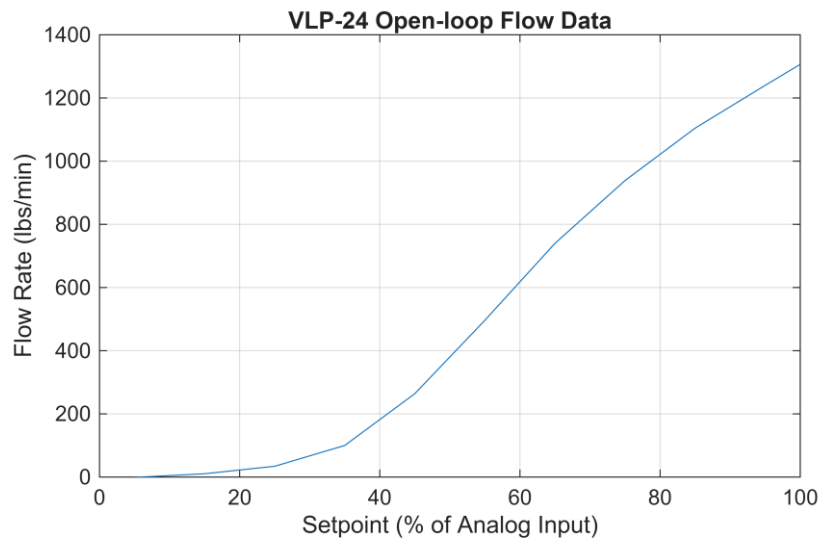
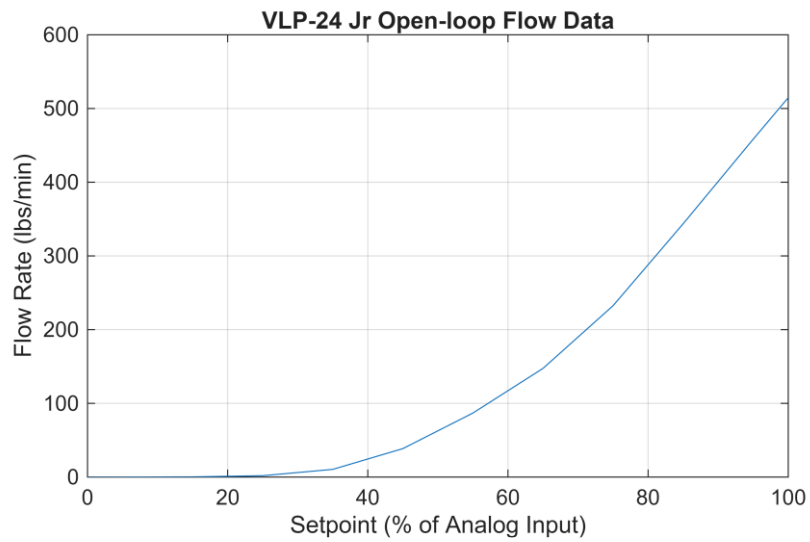
The Enable Input commands the MagnaValve to start flowing media. The input is pulled LOW (0.0 V) for the NO flow condition and driven HIGH (24 V) for the media flow condition.

Analog Input Requirements

Parameter	Value
Voltage Input	0 V to 10 V

Analog Input is the flow request signal. The Analog Input controls the MagnaValve in the open-loop mode. Where the 0 Vdc to 10 Vdc input signal translates to 0% to 100% PWM output signal to the valve driver. With an input of 0 Vdc, the valve will turn ON 0% or 0 lb/min of flow. With an input of 10 Vdc, the valve will turn on 100% or the maximum flow capability of the MagnaValve. See the graphs on the next page.

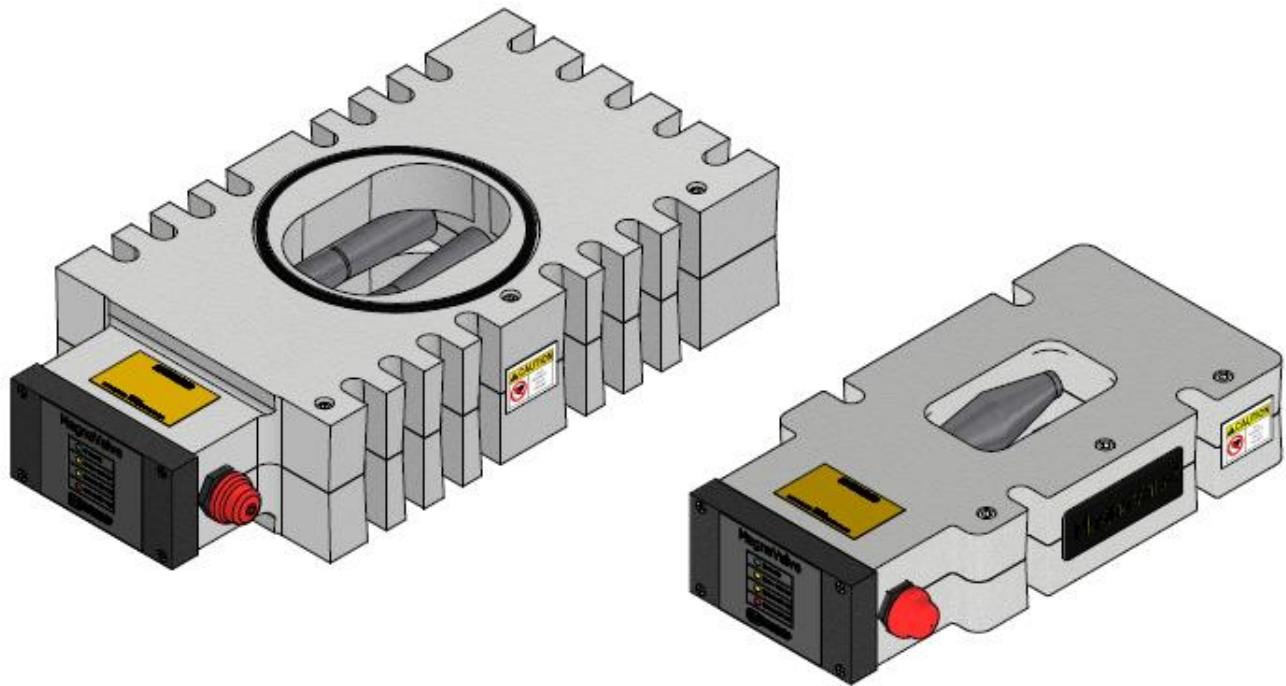
Note: The open-loop flow rate of the MagnaValve is non-linear. Examples are shown on the next page.

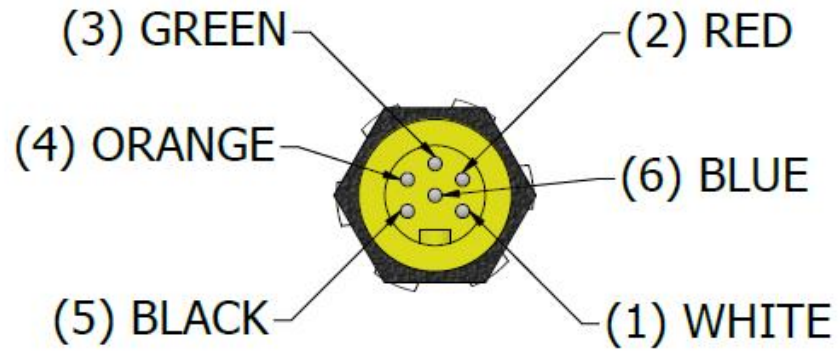


Connector

The VLP-24, VLP-24Jr, and LP-24 MagnaValve® are equipped with a connector that contains the necessary power and control lines for normal operation of the MagnaValve.

The connector is the primary communication link between either the AC-24 or Pot-24 and the MagnaValve. The connector transmits the following signals: power, signal common, analog input, and enable (see illustration below). These signals will control the MagnaValve during operation. Each signal's function is discussed in detail in the Electrical section.

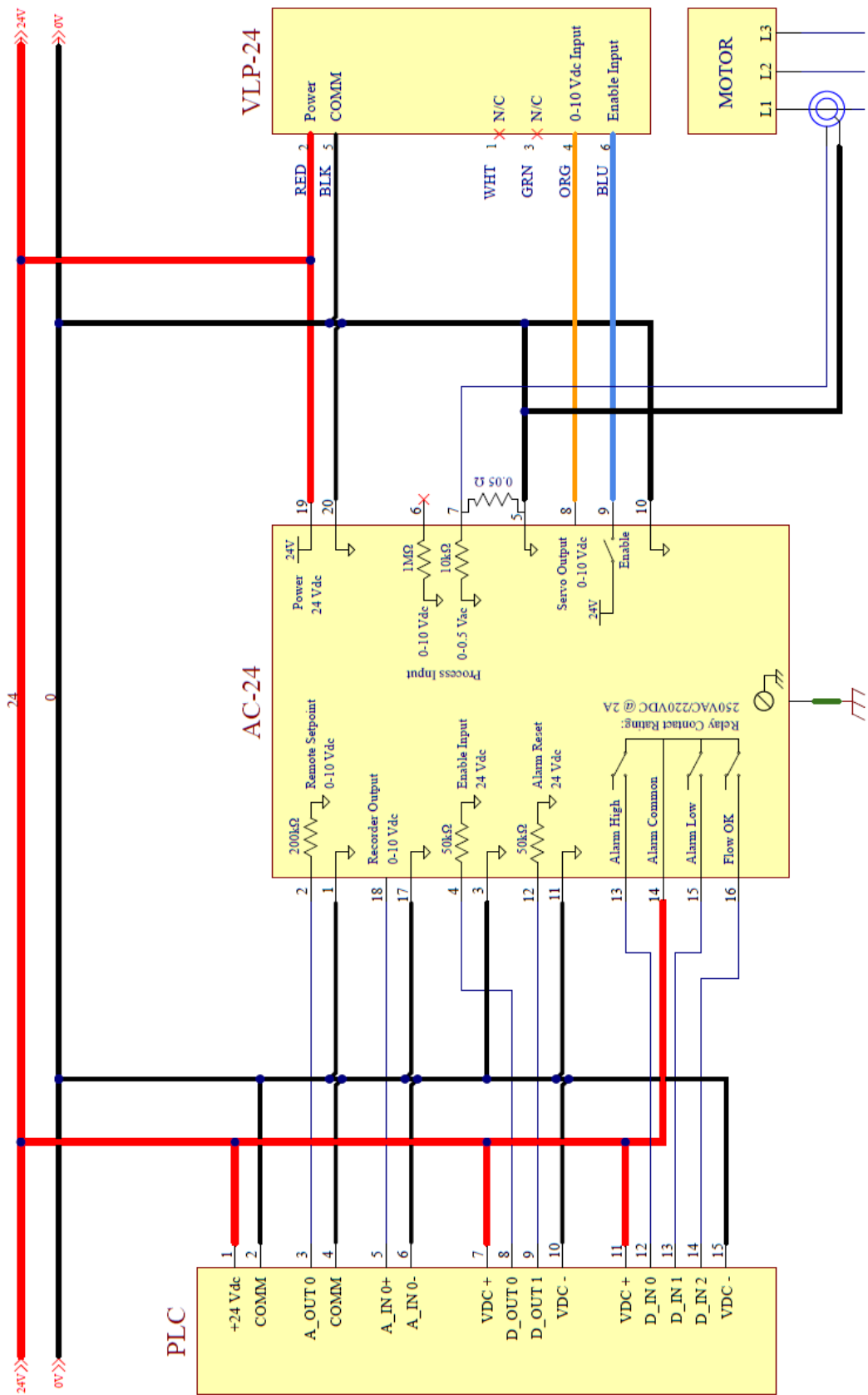




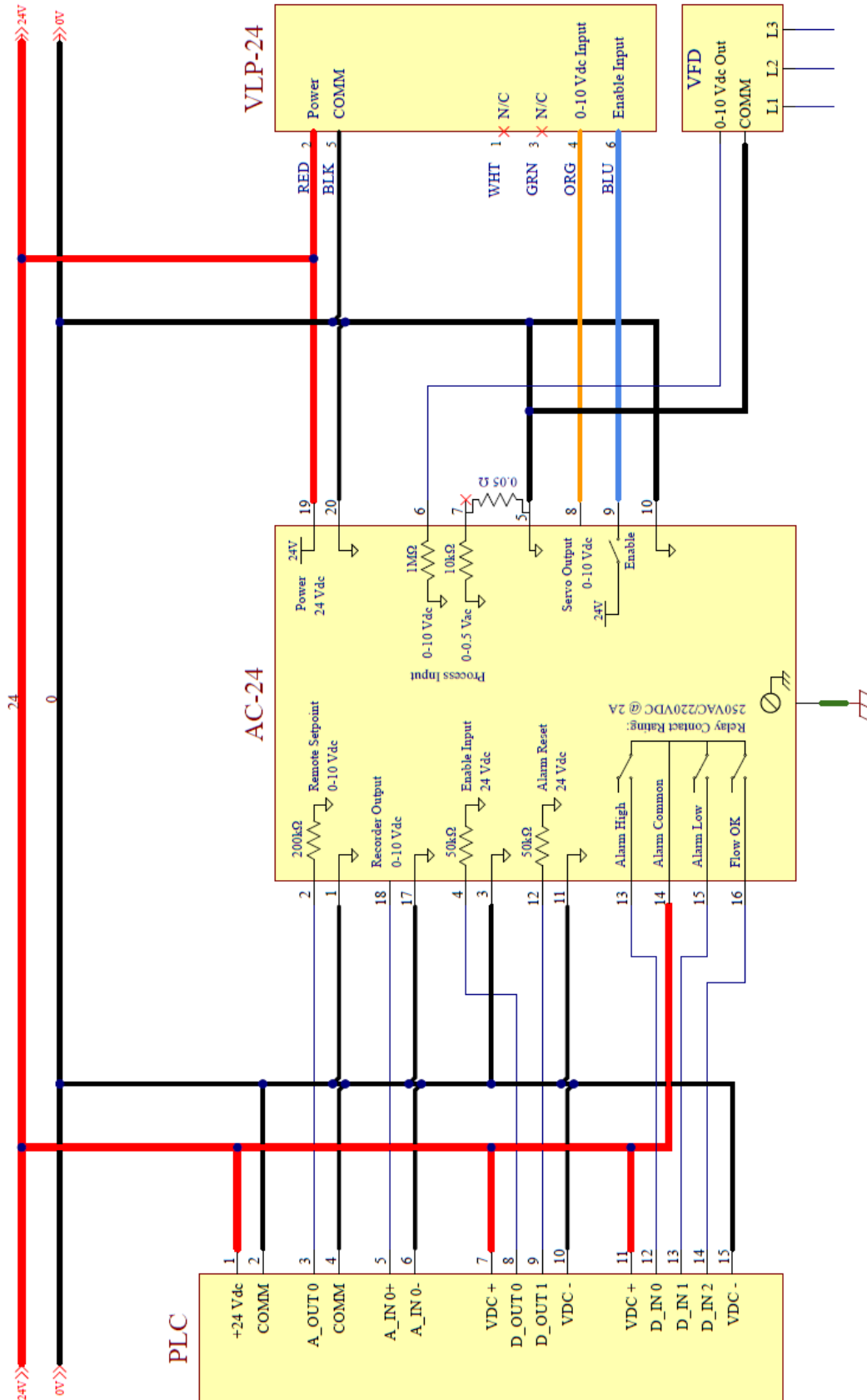
Connector Pin Functions

Wire	Function	Voltage
Red	24 Vdc Supply	24 Vdc
Black	Signal Common	0 V
Green	Not Used	
Orange	Analog Input	0 – 10 V
White	Not Used	
Blue	Enable Input	24 Vdc

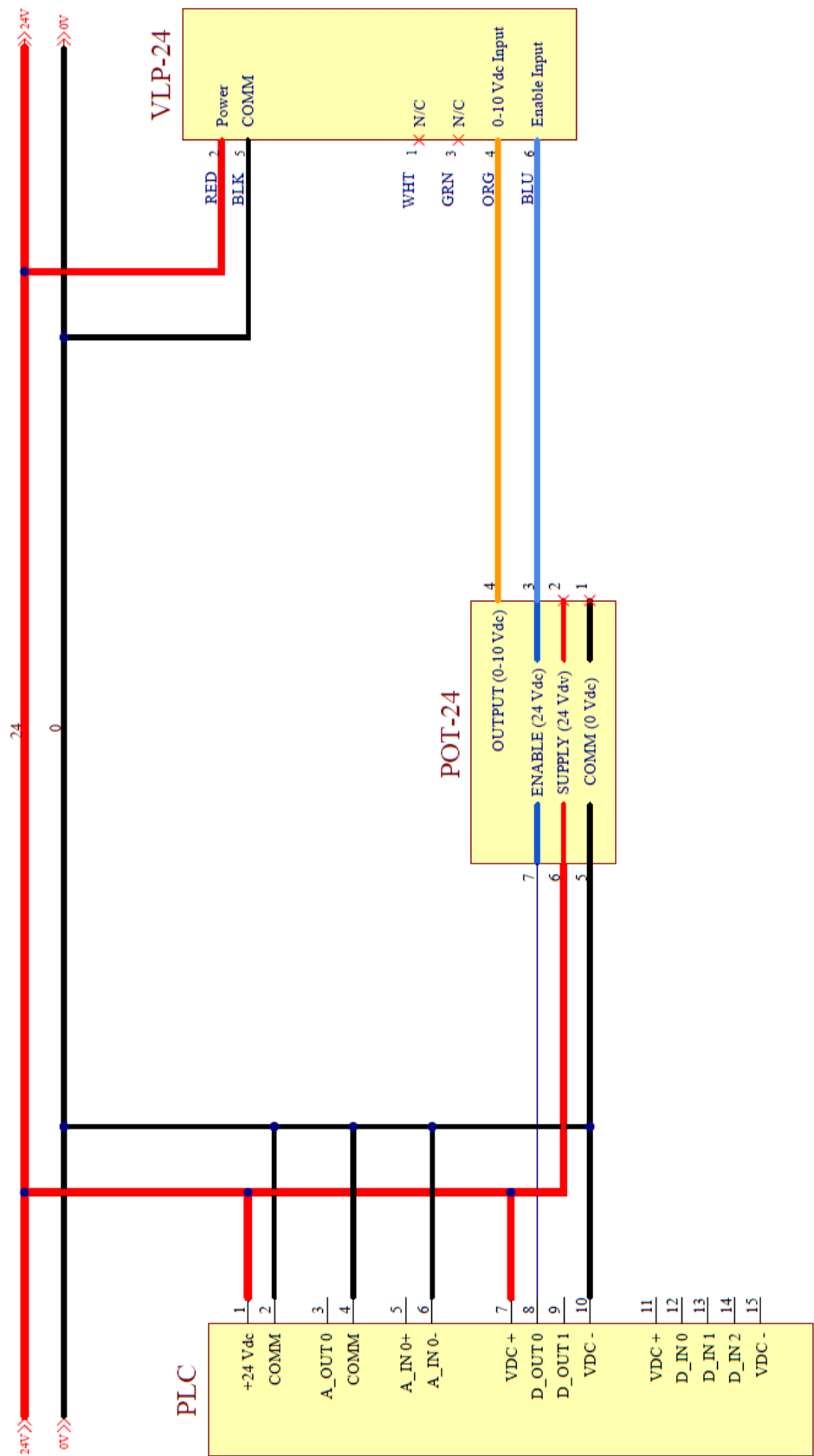
Wiring the MagnaValve® Using an AC-24 Controller and Current Transformer



Wiring the MagnaValve® Using an AC-24 Controller and VFD

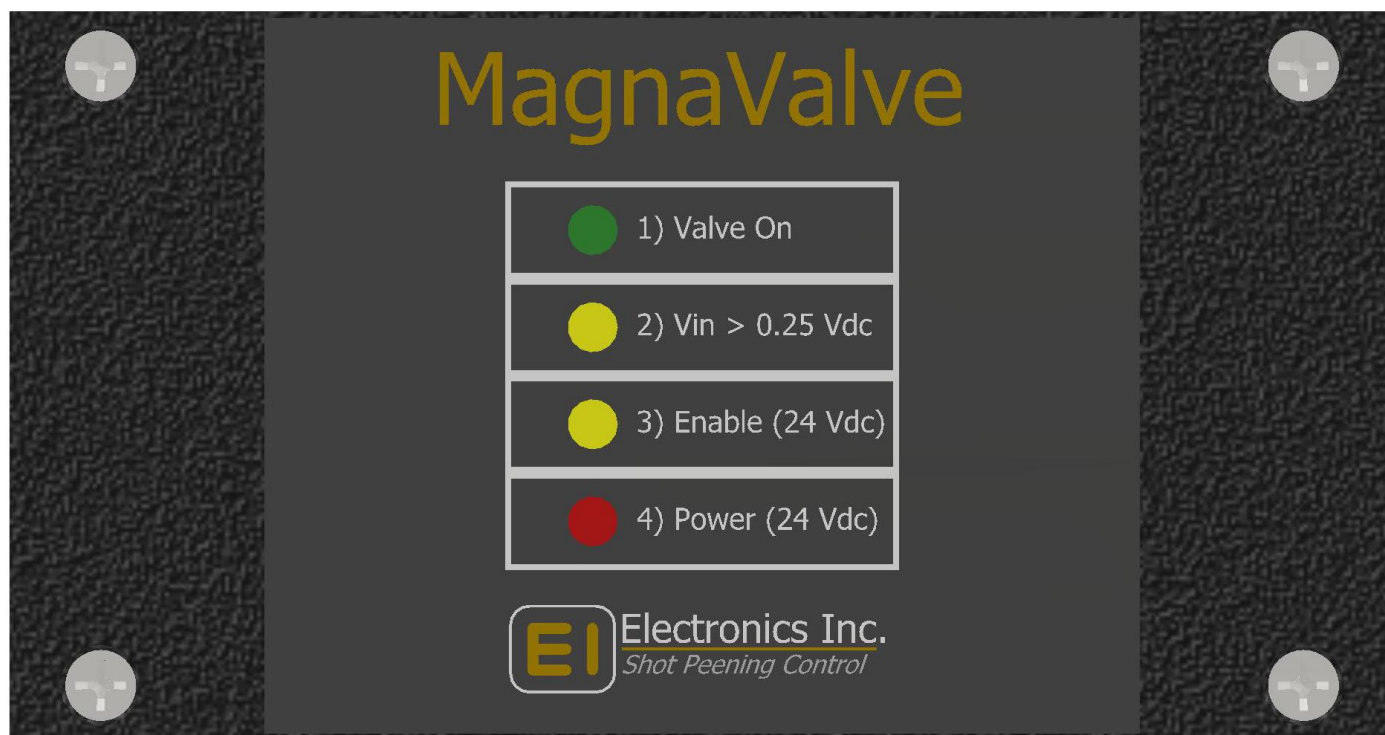


Wiring the MagnaValve® Directly to a Pot 24



MagnaValve® Operation

LED Status Indicators



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 media as determined by the AC-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 the media flow control signal is present
- 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

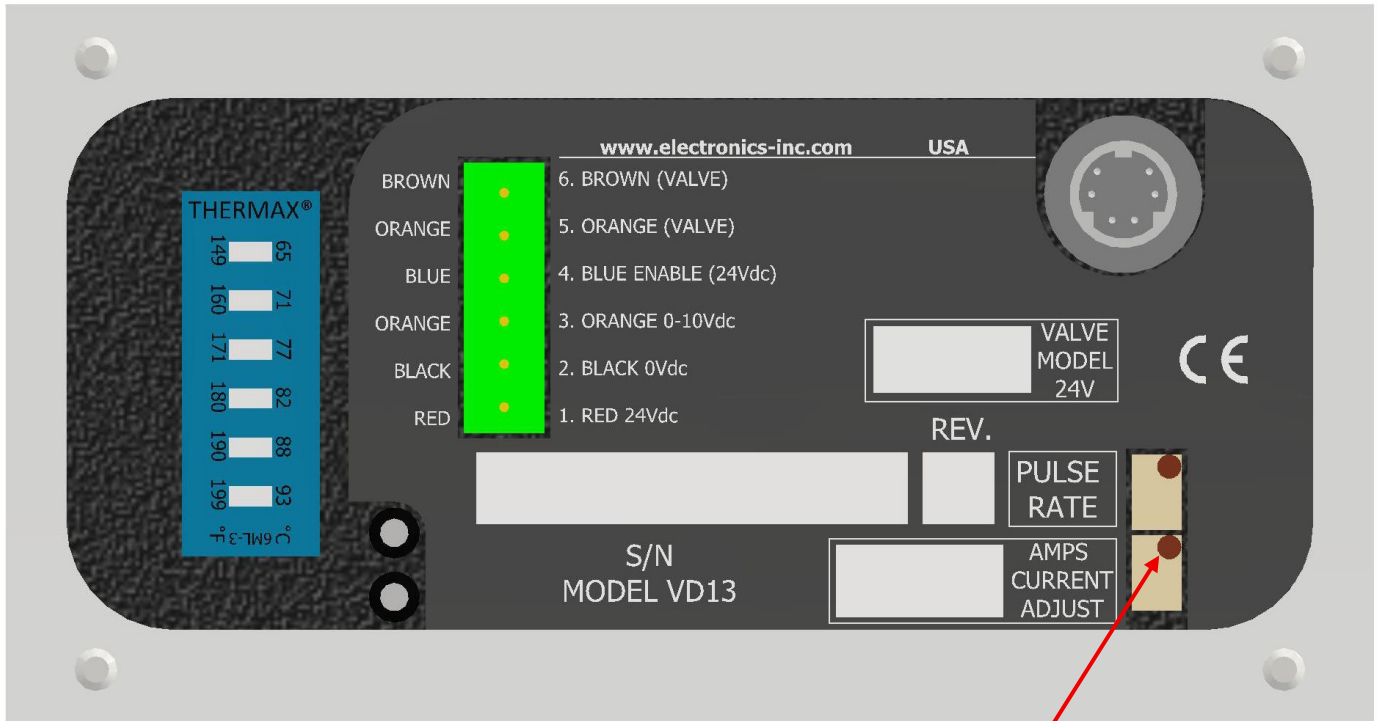
- ON – Valve is enabled and if the Vin LED is illuminated, then media will flow
- OFF – The valve is not enabled, and no media is allowed to flow

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

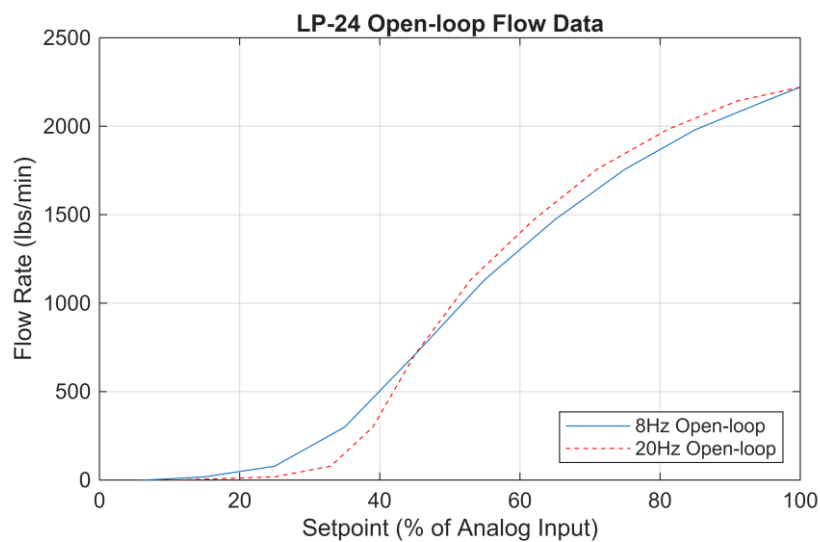
- OFF – No 24 Vdc power is available
- Red ON – 24 Vdc power is available (within tolerance)
- Red Blinking – Power is available but not within the tolerance band 24 Vdc, ± 2 Vdc
- Green ON – Microprocessor failure - return valve driver to Electronics Incorporated for service

Pulse Frequency

The Pulse Rate Adjustment changes the Pulse Frequency. Turning the adjustment clockwise will increase the Pulse Rate. Turning the adjustment counterclockwise will decrease the Pulse Rate. Increasing the rate will change the open loop profile as seen in the graph below. The graph represents the open loop flow of shot/grit at 8 Hz and 20 Hz. The Pulse Frequency or Pulse Rate comes set at 8Hz but can be set between 6Hz-20Hz.



DO NOT ADJUST



MagnaValve® Certification

Factory Certification – This is the date the MagnaValve was certified at the factory. The Factory Certification date may be the certification at the time of purchase or when the MagnaValve was sent back to the factory for recertification.

MagnaValve® Maintenance

None

Replacement Parts

VD-13HT-999343

VD-13-999335

Contacting Electronics Inc.

Mailing and Shipping Address:

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Mishawaka, IN 46545 USA

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Fax: (574) 256-5222

Email: sales@electronics-inc.com

Website: www.electronics-inc.com

Limited Warranty

VLP-24 Jr, VLP-24, and LP-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 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 reinstallation 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.