



24 Vdc MagnaValve® *for Air-Blast Machines*

Instruction Manual



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.
- The MagnaValve operates with internal air pressure. Refer all servicing to qualified personnel.
- Power off the FC-24 Controller before connecting or disconnecting the MagnaValve.

Product Overview

The 24 Vdc series MagnaValves regulate the flow of ferrous media in shot peening and abrasive blast cleaning machines. These valves have a magnetic control section (upper portion) and a shot flow rate sensing section (lower portion). 24 Vdc MagnaValves are used in direct pressure, gravity-fed and suction-blast (venturi-style nozzles) air-blast machines.

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.

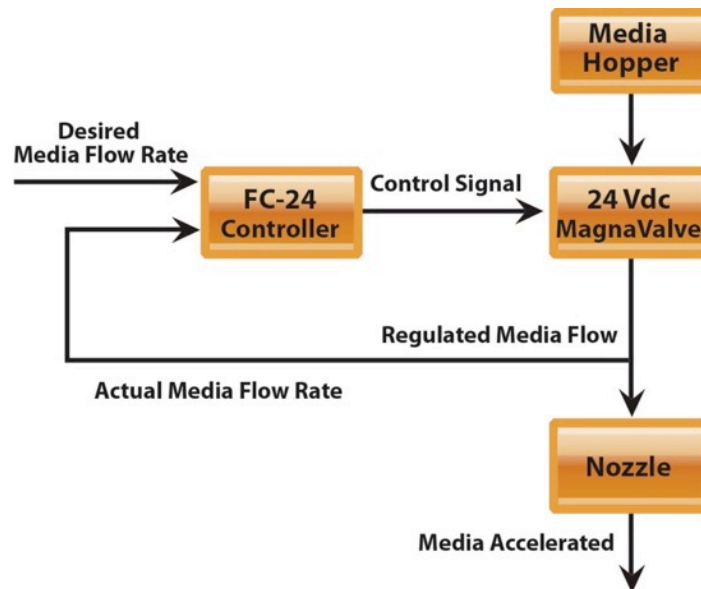
The MagnaValve is factory calibrated and results are supplied upon request.

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 24 Vdc 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 24 Vdc 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 ± 2 Vdc
- Green ON = Microprocessor failure - return valve to Electronics Incorporated for service

Installation

The following items are required for the installation of a 24 Vdc MagnaValve:

Pipe Fitting Requirements	Models 576 - 577	Models 578 - 579	Models 580 - 590
Two (2) NPT Male-Threaded Short Nipple Pipe Fittings	1"	1 ¼"	2"
Two (2) NPT Pipe Unions	1"	1 ¼"	2"
One (1) Mixing Tees	1"	1 ¼"	2"

- Thread sealant (Teflon® tape)
- Other fittings as required
- A 150% capacity manual shut-off valve mounted above the MagnaValve for maintenance
- For direct pressure applications only - an automatic shut-off valve mounted below the MagnaValve.

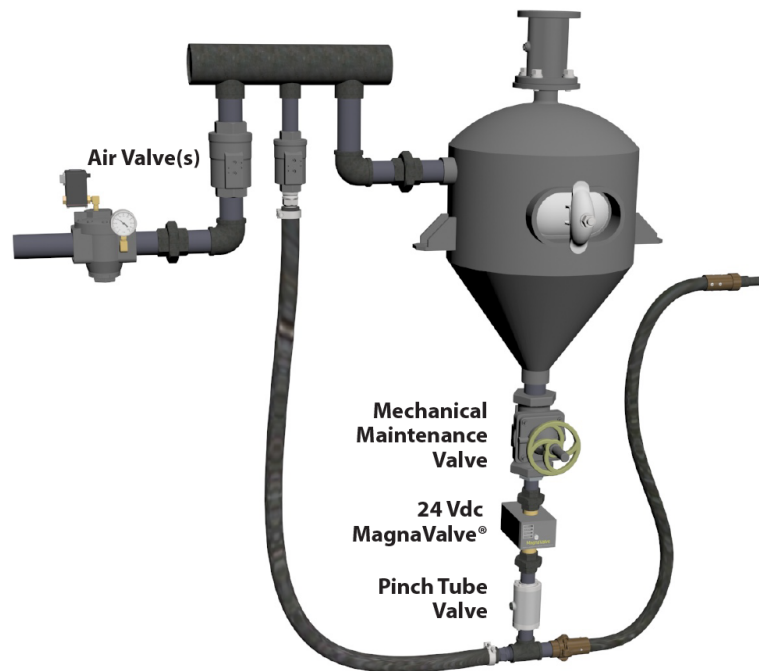
Critical Requirements for Direct Pressure Machine Applications

The following are critical requirements for the installation and operation of the 24 Vdc MagnaValve on a direct pressure machine. Failure to follow these steps could result in damage to the MagnaValve and void its warranty.

Installation

To correctly install a 24 Vdc MagnaValve on a direct pressure machine, perform the following steps.

- Install a mechanical maintenance valve above the MagnaValve
- Install a pinch tube valve below the MagnaValve
- The mechanical maintenance valve and pinch tube valve must be rated at 150% of the maximum anticipated media flow rate



Operation

The following steps must be followed in sequence when starting and stopping a blast cleaning or shot peening cycle.

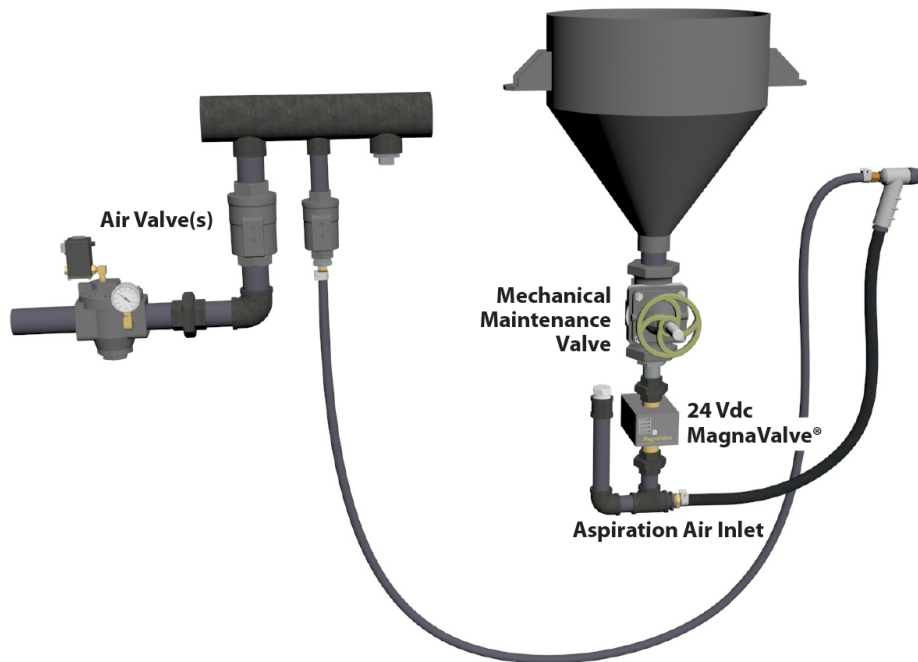
To start the blast/peen cycle	To stop the blast/peen cycle
1. Turn on the air valve(s)	1. Turn off the MagnaValve
2. Wait 10 seconds for air to stabilize	2. Close the pinch tube valve
3. Open the pinch tube valve	3. Wait 10 seconds while media clears the blasting hose
4. Turn on the MagnaValve	4. Turn off the air valve(s)

Critical Requirements for Suction Blast Machine Applications

The following are critical requirements for the installation and operation of the 24 Vdc MagnaValve on a suction blast machine. Failure to follow these steps could result in damage to the MagnaValve and void its warranty.

Installation

- Install a mechanical maintenance valve above the MagnaValve.
- The aspiration air inlet must be large enough to supply adequate air volume to allow conveyance of the media to the nozzle.



Operation

The following steps must be followed in sequence when starting and stopping a blast cleaning or shot peening cycle.

To start the blast/peen cycle	To stop the blast/peen cycle
1. Turn on the air valve(s)	1. Turn off the MagnaValve
2. Wait 10 seconds for air to stabilize	2. Wait 10 seconds while media clears the blasting hose
3. Turn on the MagnaValve	3. Turn off the air valve

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 routing of wires for chassis grounding (separate from Signal Ground)
- Figure 2 illustrates the routing of signal wires between the FC-24 Controller and the MagnaValve that is acceptable for most applications
- Figure 3 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.

Figure 1. Routing of Wires for Chassis Grounding

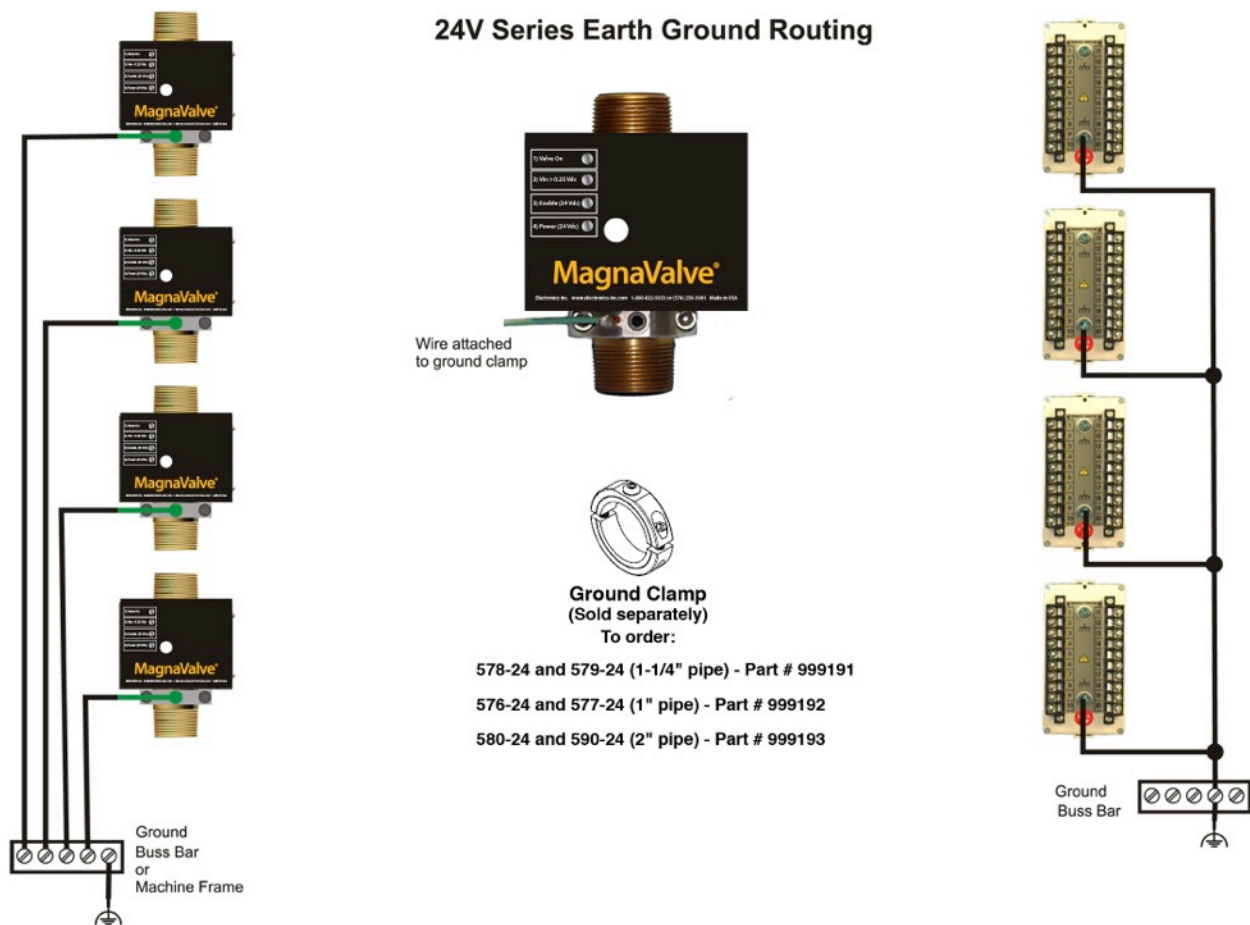


Figure 2. MagnaValve and FC-24 Controller Wiring

Acceptable for most applications

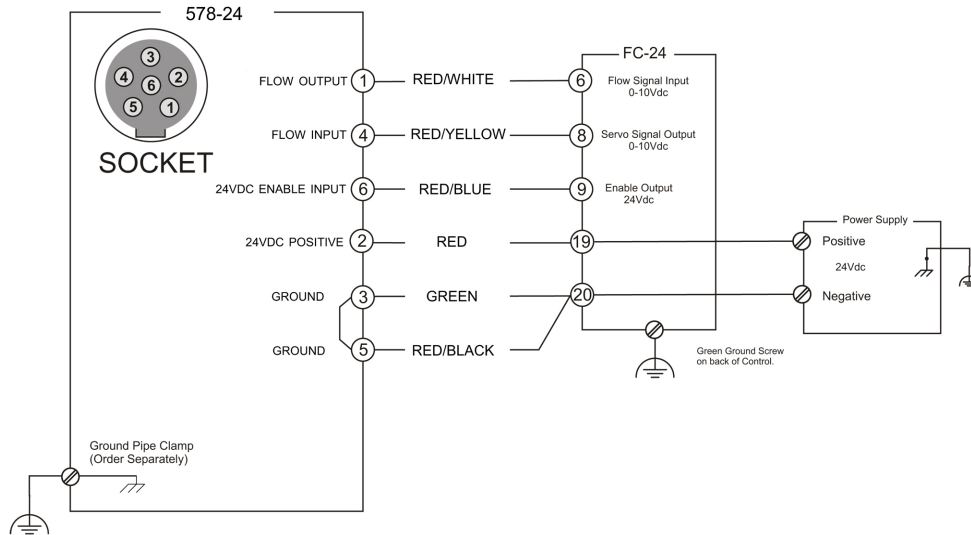
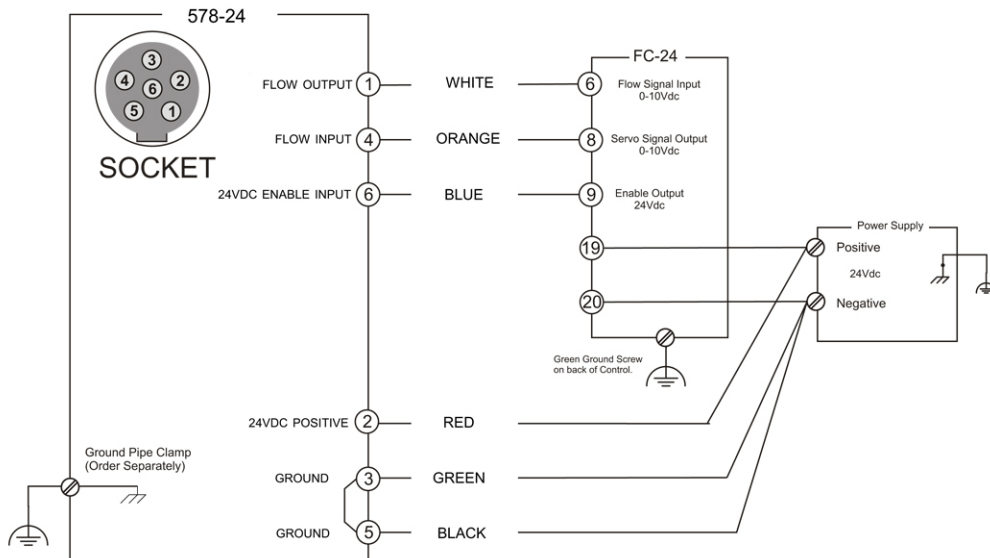


Figure 3. MagnaValve and FC-24 Controller Wiring

Preferred for noise immunity and ground-loop issues



A 6-ft. long conductor cable and 6-pin plug is 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 24 Vdc 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 24 Vdc 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.

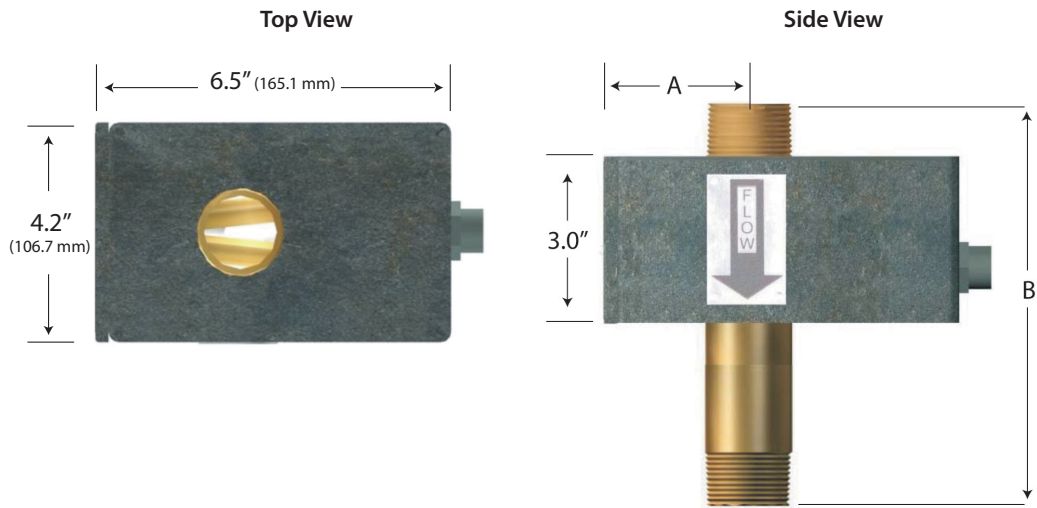
Specifications

Power	+24 Vdc \pm 2 Vdc @ 2A
Adjustments	Zero, Span, Pulse Rate
Maximum Pressure	100 PSI
Maximum Differential Pressure	5 PSI
Mode	Normally Closed
Media	Steel Shot
Temperature Range	40°F - 110°F (5°C - 43°C)
Enable Input Signal	24 Vdc
Flow Signal Output	0-10 Vdc
Servo Input Signal	0-10 Vdc

24 Vdc MagnaValve Selector Guide Based on Flow Rate

Maximum Flow Rate (pounds per minute/kilograms per minute)												
Shot	576-24		577-24		578-24		579-24		580-24		590-24	
Size	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
S-70	2	1	10	5	30	15	100	45	200	90	300	150
S-110	2	1	10	5	30	15	100	45	200	90	300	150
S-170	2	1	10	5	30	15	100	45	200	90	300	150
S-230	2	1	10	5	30	15	100	45	200	90	300	150
S-280	-	-	10	5	28	13	100	45	200	90	300	135
S-330	-	-	-	-	26	12	100	45	200	90	300	135
S-390	-	-	-	-	25	11	100	45	200	90	250	125
S-460	-	-	-	-	25	11	85	38	200	90	250	125
S-550	-	-	-	-	-	-	70	32	200	90	250	110
S-660	-	-	-	-	-	-	70	32	200	90	240	105
S-930	-	-	-	-	-	-	45	20	200	90	225	100
CCW-14	2	1	10	5	30	15	100	45	200	90	300	150
CCW-23	2	1	10	5	30	15	100	45	200	90	300	150
CCW-28	2	1	10	5	30	15	100	45	200	90	300	150
CCW-32	-	-	10	5	30	13.5	100	45	200	90	300	135
CCW-35	-	-	-	-	26	12	88	40	200	90	300	135

Product Dimensions



Model Number	Pipe Size (NPT)	"A"	"B"
576-24	1"	2.5" (63.5 mm)	6.0" (152.4 mm)
577-24	1"	2.5" (63.5 mm)	6.0" (152.4 mm)
578-24	1.25"	2.5" (63.5 mm)	6.0" (152.4 mm)
579-24	1.25"	2.5" (63.5 mm)	8.0" (203.2 mm)
580-24	2"	2.9" (73.6 mm)	8.0" (203.2 mm)
590-24	2"	2.9" (73.6 mm)	8.0" (203.2 mm)

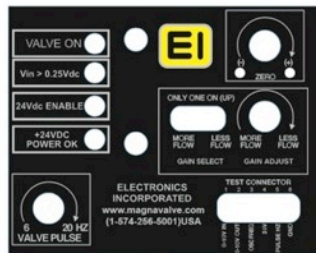
Troubleshooting Guide

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

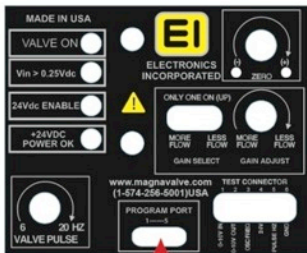
1. Is the mechanical valve above or below the MagnaValve fully open?
2. Is media available from the hopper?
3. Is there a blockage above or below the MagnaValve?
4. Are there air leaks, especially above the MagnaValve or at the nozzle?
5. Is the magnetic field completely canceled when the Green "Valve 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.

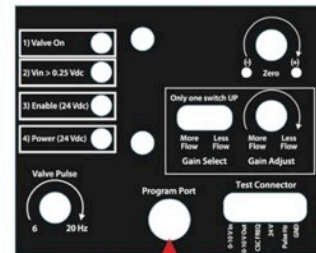
1. Type of system: ☐ Air Blast ☐ Suction Blast ☐ Gravity Blast
2. Number of valves on the machine
3. Controller model
4. Valve model _____ Valve serial number _____
5. Media type ☐ Cast Steel ☐ Cut Wire ☐ Grit ☐ Other
6. Media size
7. Blast pressure (PSI)
8. Flow rate (lb/min or kg/min)
9. Cycle time
10. Time between cycles
11. Nozzle size ID
12. Blast hose ID
13. Blast hose length
14. Is there a shut-off valve? ☐ Above or ☐ below the MagnaValve?
15. Number of valves on one power supply
16. Valve generation: ☐ First ☐ Second ☐ Third



**First Generation
No Program Port**



**Second Generation
Oval Program Port**



**Third Generation
Round Program Port**

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 24 Vdc 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

Website: www.electronics-inc.com

Limited Warranty

24 Vdc 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 of time, 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.