Model 700-24 MagnaValve®
for Ceramic Media

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

U.S. Patent 8,388,407 B1 • U.S. Patent 9,126,305 B2 • Japan Patent 6,313,057

IM0114 2024-01

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Safety Notices

Warning: 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.
- Do not remove the cover plate until machine air pressure has been properly locked out.
- Do not operate the MagnaValve without properly connecting it to an earth ground, using the grounding screw provided on the back panel.
- Power off the FC-24 Controller before connecting or disconnecting the MagnaValve.
- Remove contamination and clear all screws and screw holes of any loose media with compressed air before fastening screws.

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

Product Overview and Principle of Operation

The 700-24 MagnaValve® is a normally closed valve that regulates the flow of ceramic media in suction-type or pressure-type air blast machines for shot peening and blast cleaning applications.

The Low-Maintenance Construction of the 700-24 MagnaValve

- 700-24 MagnaValve has only two moving parts: A magnetic cone-style plunger that provides precise media flow regulation and a paddle that bends to measure the media flow rate.
- A rare-earth permanent magnet is located in a plunger over the orifice for normally closed operation.
- An electromagnet surrounds the magnetic plunger and raises the plunger out of the orifice, allowing media to flow with precise regulation.

The 700-24 MagnaValve controls media flow through the application of power to the electromagnet. When power is applied, the plunger is raised to allow the flow of media through the valve. When no power is applied, or if power is interrupted for any reason, the plunger drops into the orifice and securely blocks the flow of media.

Warning: Do not use ferrous media (steel shot, steel grit, cut-wire media, etc.) in the Model 700-24 MagnaValve. This will contaminate the magnetic plunger and cause product failure. Use of any of these media types will void the warranty. For proper operation, media must be free from ferrous contamination and fines (broken media and dust). The media must be free flowing. Install a magnetic separator and a screen separator in the reclaim system to ensure necessary media quality.

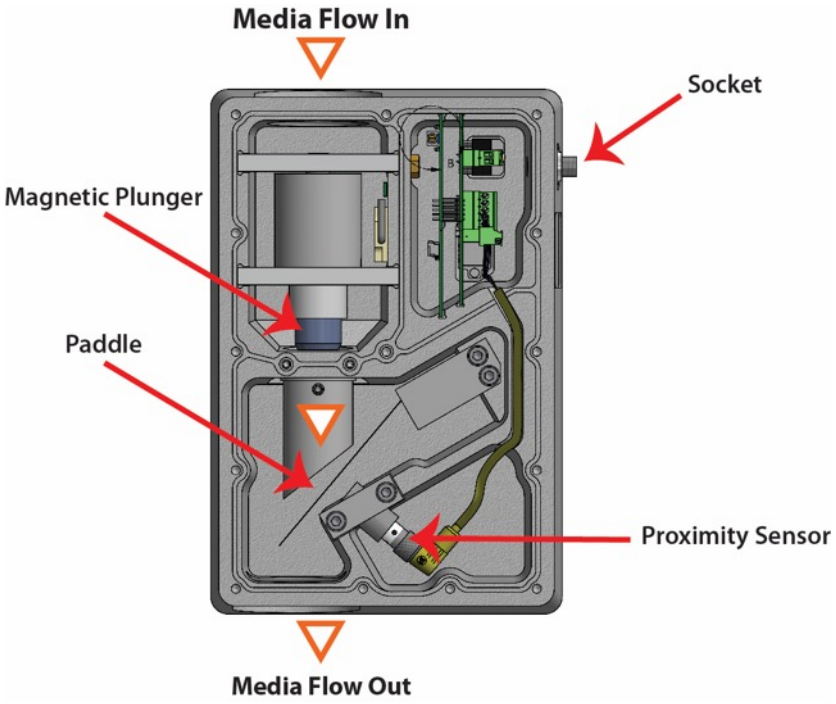
How the 700-24 MagnaValve Works

1. Current is applied to the electromagnet surrounding the magnetic plunger. The plunger is raised, allowing the media to pass through the orifice and drop onto a paddle.

2. The paddle bends downward toward a proximity sensor, which measures the paddle's displacement and generates an output signal.

3. The signal is then converted to a 0-10 Vdc analog signal for display on the FC-24 Controller.

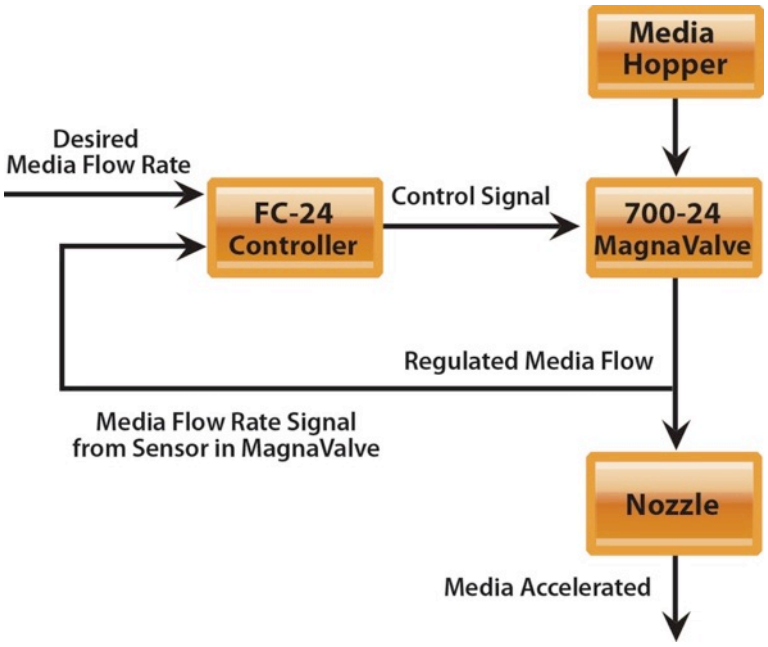
Internal View of the 700-24 MagnaValve



Closed-Loop Servo Control with the FC-24 Controller

To achieve closed-loop servo control, the 700-24 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 MagnaValve receives the control signal and raises the plunger to initiate media flow
- Media dropping onto the paddle generates a feedback signal (0-10 Vdc)
- 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 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

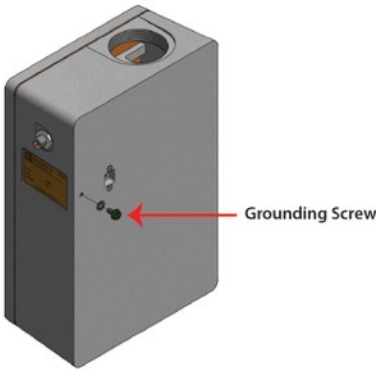
For more information on the FC-24 Controller, please call our Customer Service department at 1-800-832-5653 (toll-free in USA and Canada) or (574) 256-5001.

Installation

The following items are required for the installation of the 700-24 MagnaValve:

- Two (2) 2” NPT Male-Threaded Short Nipple Brass Pipe Fittings
- Two (2) 2” NPT Pipe Unions
- One (1) 2” Mixing Tee
- Thread sealant (Teflon® tape)
- Other fittings as required
- A mechanical maintenance valve mounted above the MagnaValve
- *For direct pressure applications only* – a pinch tube valve mounted below the MagnaValve

General Considerations



Grounding – The 700-24 MagnaValve must be properly grounded to the machine prior to use. A grounding screw is located on the back of the MagnaValve (see illustration). Connect the ground wire either to a bare metal machine frame or to the electrical panel grounding point (buss bar).

Fittings – All fittings to the MagnaValve should be made of brass. All fittings should be installed using a sealing method such as Teflon® tape to prevent air leaks. Clear the threads of any contaminants before assembly.

Positioning – The 700-24 MagnaValve must be mounted vertically with an adequate supply of media above it. A mechanical shut-off valve that can flow at least 150% of the expected flow rate should be installed above the MagnaValve to allow for maintenance and easy removal.

Installation of a Magnetic Separator and Screen Separator

The media supply for the 700-24 MagnaValve must be free from ferrous contamination and broken media. Install a magnetic separator to prevent media with ferrous contamination from covering the magnetic cone and reducing its ability to move freely. Install a screen separator to remove the broken media that affects media flow. Without these separators, the MagnaValve may require additional cleaning to maintain desired media flow and normal valve function.

Example of a contaminated cone. A contaminated cone will reduce media flow and valve function may become erratic.

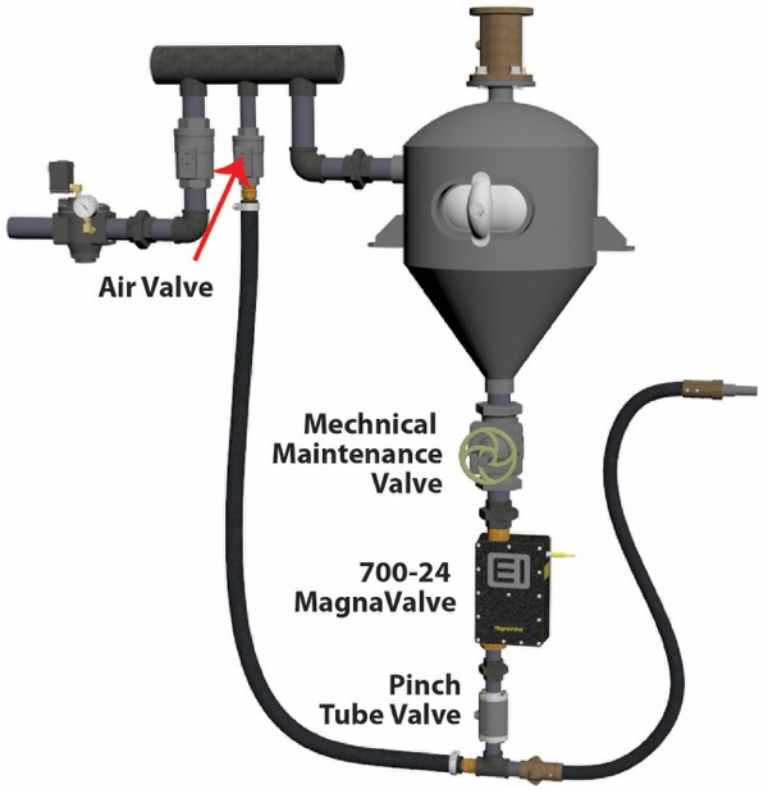
Critical Requirements for Direct Pressure Machine Applications

The following are critical requirements for the installation and operation of the 700-24 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 MagnaValve 700-24 on a direct pressure machine, perform the following steps.

- Install a mechanical maintenance valve above the 700-24.
- Install a pinch tube valve below the 700-24.
- Ensure that the pressure differential above and below the 700-24 does not exceed 5 psi.
- The mechanical maintenance valve and pinch tube valve must be rated at 150% of the maximum anticipated media flow rate.
- All fittings to the MagnaValve should be made of brass.



Operation

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

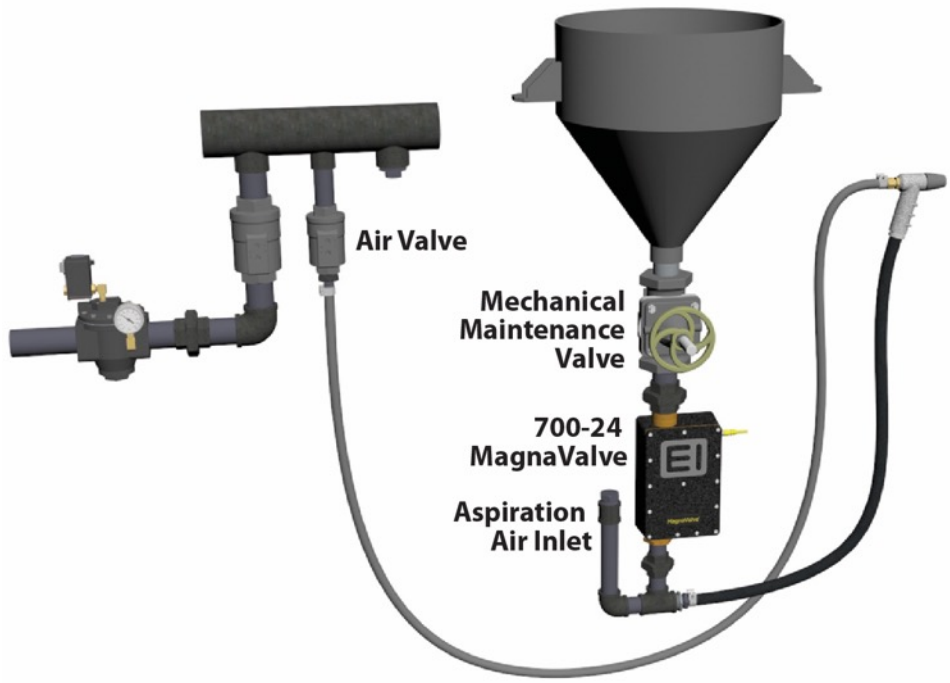
To start the blast/peen cycle	To stop the blast/peen cycle
1. Turn on the air valve	1. Turn off the MagnaValve
2. Wait 10 seconds for air to stabilize	2. Close the pinch tube valve
3. Open the pinch tube valve	3. Wait 10 seconds while media clears the blasting hose
4. Turn on the MagnaValve	4. Turn off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

Critical Requirements for Suction Blast Machine Applications

The following are critical requirements for the installation and operation of the 700-24 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 700-24 MagnaValve.
- Install an aspiration air inlet below the 700-24 MagnaValve. It must be large enough to supply adequate air volume to allow conveyance of the media to the nozzle.
- All fittings to the MagnaValve should be made of brass.



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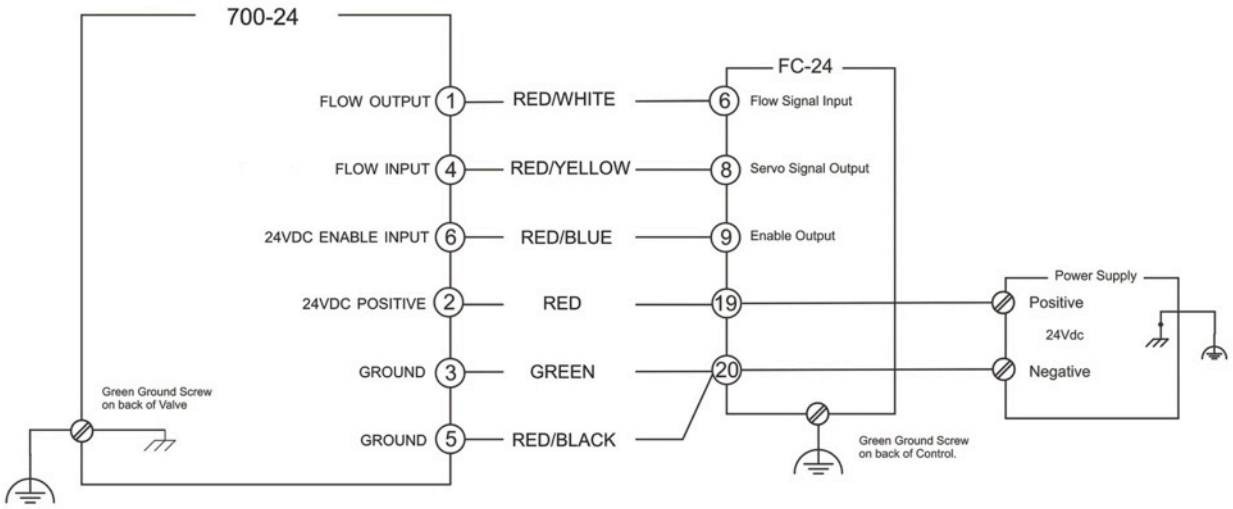
3. Turn on the MagnaValve	3. Turn off the air valve

Connecting to the FC-24 Controller

Connect the 700-24 MagnaValve to the FC-24 Controller with the supplied yellow cable, using the wiring diagram below. Remove the FC-24 front panel cover plate and apply 24 Vdc power to the controller. Push the Full Scale button to display the full-scale range of the controller and be sure it matches the full-scale range indicated on the MagnaValve's gold Calibration Label (see page 4). If it is different, adjust the controller full-scale range to match the MagnaValve. (For more information, see the FC-24 manual at www.electronics-inc.com.) Examples given below will use 20 lb/min for full-scale media flow rate.

700-24 MagnaValve and FC-24 Controller Wiring Diagram



Cable Attachment to the FC-24 Controller

A 6 ft (2 m) yellow cable with 6-pin plug is supplied with the 700-24 MagnaValve. Be sure that both the green and the red/black wires are attached to screw terminal #20 on the FC-24 Controller.

Other connections may be made to the FC-24 Controller to allow remote command of the Set Point and Enable. See the FC-24 Controller Instruction Manual for more information. (The FC-24 manual is available at www.electronics-inc.com.)

Standard Applications

For standard applications, the FC-24 Controller can be programmed for complete operation of the 700-24 MagnaValve. Push the Set Point button and enter a convenient flow rate value. **Be sure the FC-24 control servo is ON**. For demonstration purposes, choose 50% of the full scale. (For example, for 20 lb/min full scale, choose 10 lb/min set point.) Push the Mode button until the "ON" LED is illuminated. This will transmit a 50% command to the MagnaValve and transmit the Enable signal to the MagnaValve. To verify that the actual flow rate was 10 lb/min, it will be necessary to conduct a catch-and-weigh test (download the Calibration Instruction Manual for the 700-24 at www.electronics-inc.com).

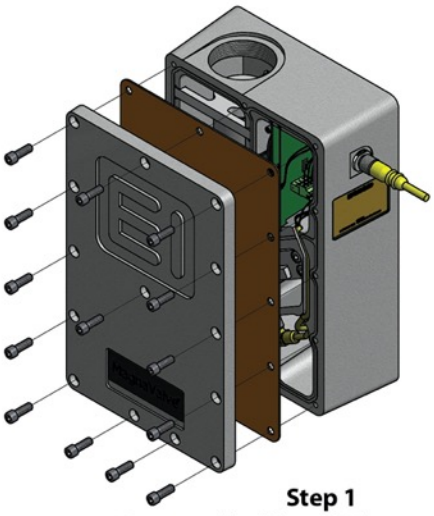
Maintenance - Paddle Replacement

To complete the first three steps, you will need:

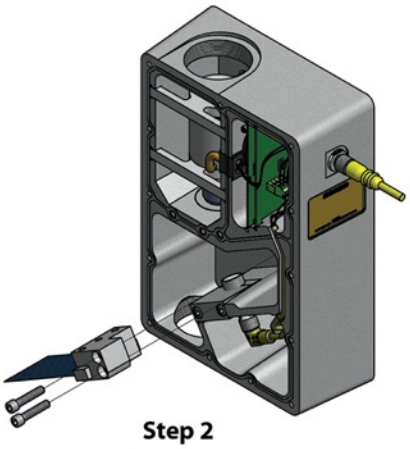
• 3/16" Hex wrench • 5/32" Hex wrench

The paddle is subject to wear due to media abrasion and may need to be replaced periodically. Inspect the paddle whenever the catch test accuracy is not acceptable. To determine if the paddle should be replaced, it is necessary to remove the cover plate. The paddle is installed near a metal proximity sensor. This sensor detects bending of the paddle and a signal is generated that is converted into a flow rate signal. Installation of the paddle relative to the face of the proximity sensor is critical to proper operation.

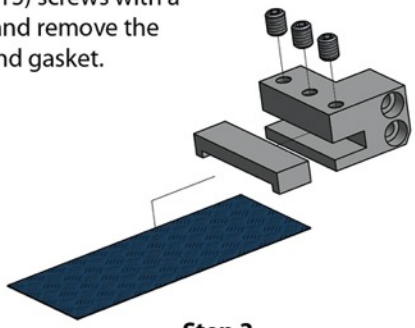
Warning: Empty the MagnaValve before removing cover plate. Disable and lockout the air pressure before removing screws from the cover plate. Close the maintenance valve above the MagnaValve to prevent media from spilling out of the valve while the cover plate is removed.



Step 1
Remove the fifteen (15) screws with a 3/16" Hex wrench and remove the cover plate and gasket.



Step 2
Remove the two (2) screws with a 3/16" Hex wrench and pull out the paddle assembly.



Step 3
Remove the three (3) screws with a 5/32" Hex wrench, remove the paddle and install a new paddle.
Replace and tighten the three (3) screws in the paddle assembly.
Return paddle assembly to the unit and replace and tighten the two (2) screws.

Step 4

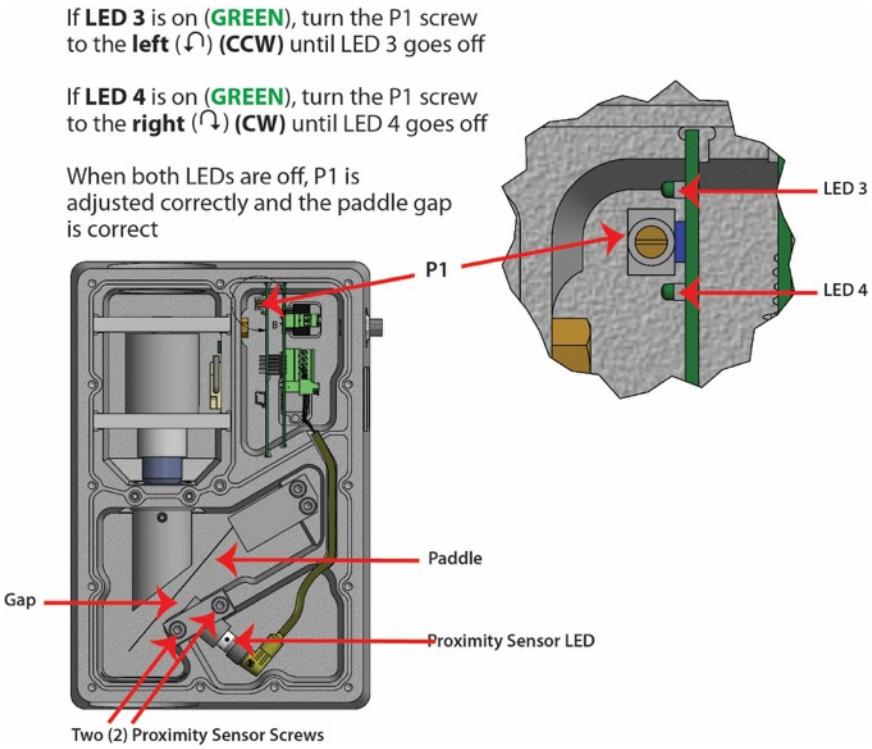
You will need:

• 3/16” Hex wrench • Flat blade screwdriver

The gap between the sensor and paddle needs to be adjusted after paddle installation, following these steps:

1. Apply power to the MagnaValve.
2. Using a 3/16” Hex wrench, loosen the (2) screws that secure the proximity sensor to the valve. The sensor should slide with light to moderate resistance.
3. Locate the red LED on the proximity sensor. It should illuminate as the sensor is moved away from the paddle (out of sensing range).
4. Slowly slide the sensor towards the paddle. Stop when the sensor LED goes off (paddle is in sensing range).
5. Tighten the (2) sensor screws. It is typical for the sensor to move slightly during this tightening operation and one of the green LEDs may illuminate. The P1 (Fine Adjustment Trimpot) can compensate for this movement, using the following method.
   - Locate P1 and the two LEDs: L3 and L4 (Sensor Fine Adjustment LEDs)
   - Using a flat blade screwdriver, adjust P1 until both L3 and L4 are off:
     - Turn counterclockwise if L3 is illuminated
     - Turn clockwise if L4 is illuminated

Note: If one of the two LED’s remains illuminated and you are unable to extinguish both LEDs, adjust P1 to its mid-point (half of the 15-turn range). Next, loosen the two Proximity Sensor Screws and re-position the Proximity Sensor repeating steps 2-7 above.



Step 5

Clean media from screw holes and screws. Replace the cover plate and gasket. Replace and tighten the 15 screws. Torque requirement is 50-60 inch-pounds.

Calibration

The MagnaValve's flow rate is factory calibrated for the media type, size, and flow rate as specified on the Purchase Order. Refer to the gold Calibration Label on the side of the valve for this information.

An annual calibration of the 700-24 MagnaValve is recommended. The annual calibration should be based on the first date of use, not the factory date of calibration. We recommend that you apply a sticker to the 700-24 MagnaValve that documents the first date of use and the due date of the next calibration. You may perform the calibration in-house or return it to Electronics Inc. for a factory calibration.

To perform an annual calibration in-house, download the 700-24 MagnaValve Calibration Instruction Manual at www.electronics-inc.com. For directions on how to return the MagnaValve to Electronics Inc. for an annual calibration, please contact our Customer Service department at 1-800-832-5653 (Toll-free in USA and Canada) or (574) 256-5001, or send an email to sales@electronics-inc.com.

Specifications

Power Requirements

Supply Voltage	24 Vdc ±10% (21.6 – 26.4 Vdc)
Supply Current	1.0 A

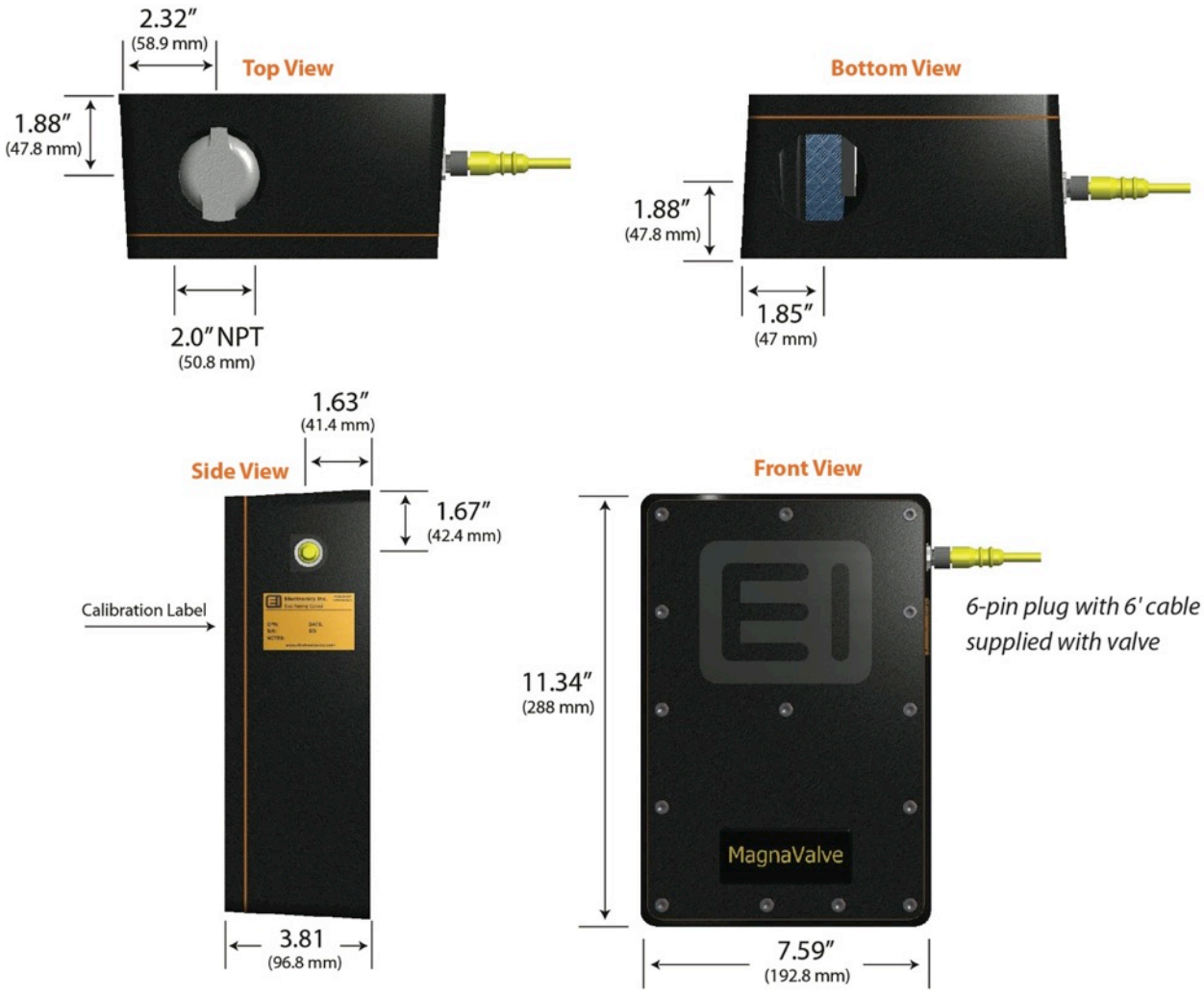
Electrical Specifications

Servo Command (Input)	0 - 10 Vdc
Enable (Input)	24 Vdc
Flow Sensor (Output)	0 - 10 Vdc, max output 11.5 Vdc

General Specifications

Weight	19.4 lb / 8.8 kg
Mode	Normally closed
Media	Ceramic Bead
Air Pressure	Maximum 60 PSI
Ambient Temperature	40˚F – 110˚F (5˚C – 43˚C)
Flow Ports	Top (entry) and Bottom (exit): 2” NPT Female Threads
Cover Plate Torque	50-60 inch-pounds

Product Dimensions



Replacement Parts

Part Number	Description	Quantity
801087	Screw, 1/4-20 x 3/4” SCK HD CS BLK OXIDE	2
801107	Grounding Screw, 10-32 x 3/8” GRN, SLT HEX	1
801152	Screw, 1/4-20 x 3/4” SCK HD CS BLK OXIDE	15
801502	Screw, 3/16-18 x 3/8” SET FLT PT	3
803014	Washer, #10 LOCK (for grounding screw)	1
920500	Paddle, NF VALVE 0.012” THICK	1
940010	6-pin Plug & Cable Assembly, 6 ft / 2 m	1

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

For repairs and/or return instructions, please call our Customer Service department at 1-800-832-5653 (Toll-free in USA and Canada) or (574) 256-5001. For a faster resolution to the problem, please email images to sales@electronics-inc.com of your valve installation and/or a video of the 700-24 MagnaValve during operation. Include an image of the MagnaValve’s Calibration Label.

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Limited Warranty

Warning: Use of ferrous media, such as shot or grit, will void the warranty.
This product is intended for use with ceramic media only.

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.