



Air Flo Spray Equipment Co.

The Eagle Automatic Ink Leveling System

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System overview



The Eagle automatic ink leveler is a capacitive sensing, non-contact system that maintains a user-determined level of ink in the fountain during the course of production. The system consists of a sensor which reads the actual level of ink in the fountain, and an ink distribution manifold (fountain bar) to dispense the ink into the fountain. A remotely actuated valve allows the flow of ink as required and a control unit controls the operation of the system.



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System components



The heart of the system is the control station

The images above are the leveler control stations.

The end images show the top and bottom of the station. The middle image is the front of the control station. The silver connector on the image at the far right is the Sensor connector. Opposite the sensor connector is the pilot light indicator. This will illuminate when the system is activated. The black connector is the air tubing "out" connector.

The image on the left is the bottom of the control station. The tapered piece above the red air inlet fitting is a sintered muffler for the air exhaust. Both inlet and outlet connectors are 1/4" tubing size.

The face plate of each station has a switch that will enable automatic operation with the capacitive sensor and a push button for manual fill mode. The manual fill mode is actuated by a spring return push button allowing the operator to release the button to stop the manual fill mode. The push button will function regardless of the position of the selector switch.

The station control box can be mounted on the press frame as a stand-alone piece or secured to the valve assembly via optional mounting brackets.



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Actuator/ball valve assembly



Automated 3-piece stainless steel ball valve information

- Stainless steel body/ball/stem, three piece
- Rated at 3,000 WOG, full mounting pad, live loaded stem design
- Self-adjusting Belleville washers in stem
- 2" mounting bracket and coupler configuration
- Temperature range: -40 ° to +450°
- 1/2" NPTF threads

Actuator information

- Namur and ISO standardized mounting pads
- Hardened steel, precision ground, nickel plated pinion w/ NB-70 seals
- Extruded, hard anodized aluminum body
- Fail safe, zinc phosphate coated springs
- Oversized precision balanced die cast aluminum piston
- Standard temperature rating: -4°F through +180°F



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Sensor

- Carlo Gavazzi proximity sensor
- Stainless Steel housing for long term durability
- Tripleshielded to reduce radio frequency interference
- Adjustable sensing distance: 4-25 mm
- Rated operational voltage: 20-265 VAC
- Output: Silicon controlled rectifier
- LED indication
- High noise immunity



- Hysteresis: 4-20% of sensing distance
- Temperature variable sensing drift: $\pm 10\%$
- Operating temperature: -13° to $+176^{\circ}\text{F}$
- Make or break switching function



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High pressure ink hose



- Ink hose is 1/2" I.D. with 3/8" NPTM and 1/2" NPTM ends
- Ink hose is rated at 2,000 PSI working pressure.



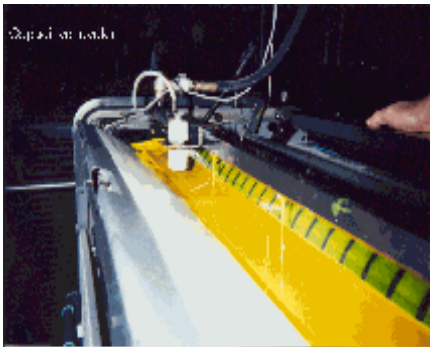
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Fountain Bar dispensing manifold

- Anodized aluminum fountain bar with 1/2" NPTF ends and one 3/8" half collar tig welded as a third inlet option.
- Anodized aluminum Talon-Grip™ cheekplate mounting brackets
- 2, 3, 4 or 6 (depending upon the length of bar) 1/8" NPTF outlet holes with 5/32" brass orifices. Brass ball cock outlets available for split fountain use
- Anodized aluminum Quickclamp sensor mounting bracket



System requirements



- Electrical: 120 VAC 50/60 Hz @ 1 amp
- Pneumatic: 80-120 PSI. A conditioned air supply is recommended



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Mounting Configurations

The illustrations below represent the suggested methods of securing the Eagle leveler control box and the fluid control valve. For illustration purposes, only the box and valve have been shown. The most common application is for the box to mount separately from the valve in the 3-piece configuration. The images shown are an older version of our ink leveler but represent a good illustration of mounting options.

Example 1 shows a dual valve mounting arrangement for a heatset web press. Bracing can be attached to either an overhead support or to the ink drop line itself. The valves can be mounted either in a vertical or horizontal configuration.

Example 2 shows two control boxes mounted to the press frame close to the fountain that is being controlled by the station. Note the two valve assemblies mounted to the ink drop in the background on the lower left of the image.

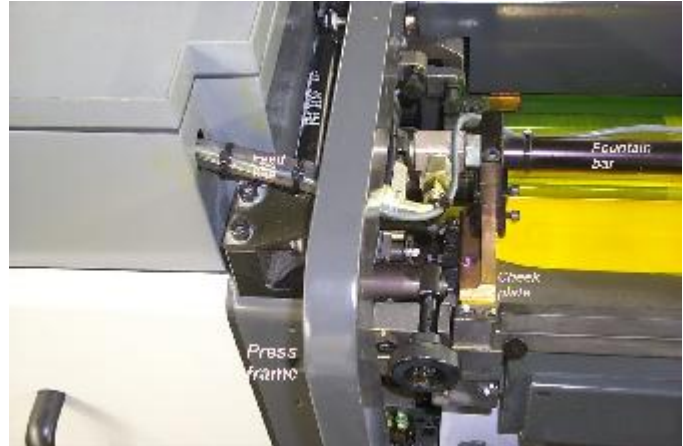




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Talon-Grip™ Hardware:

The fountain bar has been designed to accommodate most press styles and fountain sizes. The bar utilizes our exclusive Talon-Grip™ Hardware, which comes in two pieces. The top piece holds the actual fountain bar and snaps into the lower portion of the bracket assembly. The bottom portion can be either a bolt on type or can be fabricated to slide over the horizontal portion of the cheek itself. If the slide over option is chosen the measurements for the cheek must be verified and checked prior to fabrication. There must be a minimum of 3/8" clearance between the cheek plate and the frame of the press to use the slide over bracket assembly. If space is a concern we suggest that the assembly be bolted into place on the cheek plate. The clamping action of the Talon-Grip™ Hardware sets the fountain bar to the fountain and the spring ball ensures a secure fit. This configuration allows for quick release of the fountain bar for maintenance or color rotation. The Talon-Grip™



Hardware is milled from aluminum and anodized to resist corrosion.

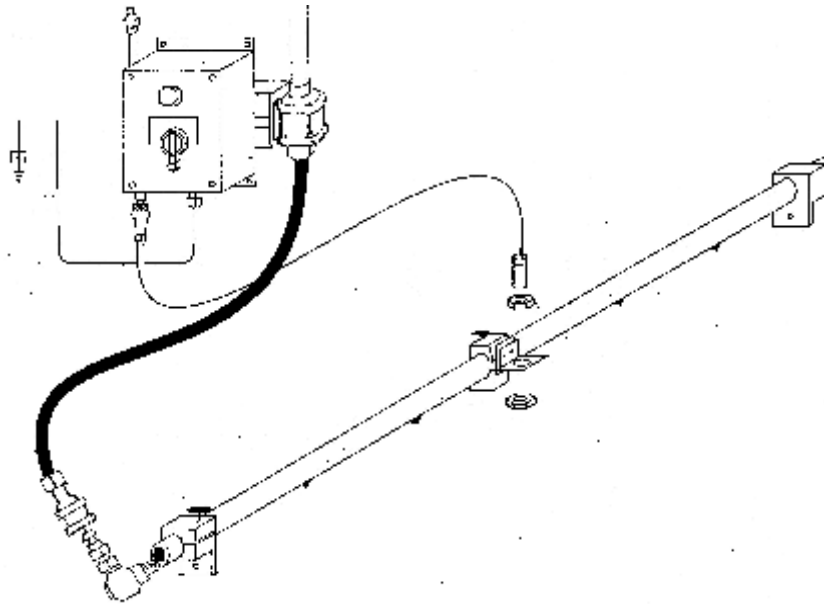


The images below illustrate the special mounting pad for Heidelberg speed master press fountains.





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The fountain bar is fabricated from schedule 80, anodized aluminum with 1/2" NPTF ends machined and a 3/8" half collar tig welded to allow the ink 3 possible inlets. The normal inlet is the 3/8" half collar. In addition to this, 1/8" NPTF holes are located along one side to allow the ink outlet orifices to be installed. 2 flush plugs located on opposite ends of the bar prevent ink from exiting the ends of the bar. If the user would like to utilize the end inlets a 3/8" by 1/2" face bushing coupling adapter would be necessary to make the connection.

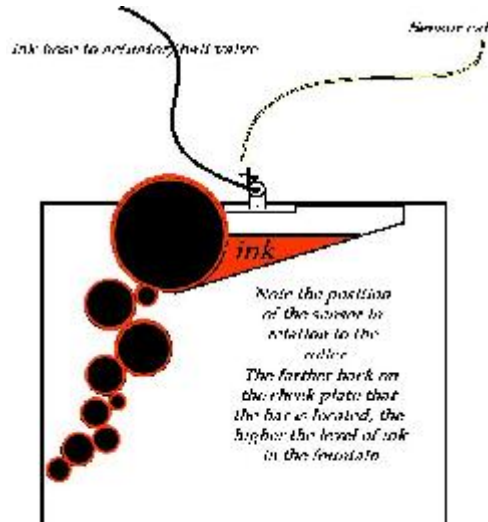
The sensor bracket is fabricated from the same material as the Talon-Grip™ hardware. The sensor bracketing is actually four pieces. The sensor bar bracket is in two pieces and it clamps around the fountain bar is tightened with the 5/16" socket head cap screw and tension is maintained with a spring. The sensor plate and bracket is a rectangular shaped plate and an "L" shaped bracket that bolts to the bar bracket (two pieces).



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Initial Setup

1. Slide the Talon-Grip™ Hardware over the ends of the fountain bar.
2. Position the sensor bar bracket over the fountain bar. Use caution as the bracket is in two pieces. Bolt the "L" shaped sensor bracket to the sensor bar bracket using the 10-32 cap screws provided. Ensure that the screws are tight. If using outlet spigots the sensor bracket should be on the same plane with the outlet fittings. If the fountain bar has been equipped with outlet spigots, position the sensor on the same side as the spigots. The bar can be reversed to allow the spigots to face the ink ball or face away from the ink ball.
3. Position the fountain bar on the fountain so that the "L" shaped bracket is directly over the "knife-edge" of the fountain, or where the fountain and roller, or ink ball, come together. **The ideal location of the sensor is directly over the "knife-edge" of the fountain. Be advised that if the sensor is located too close to, or over the roller, it will give an erroneous reading and will not perform as intended. Conversely, if it is located too near to the lip or back of the fountain it will maintain too large a quantity of ink in the fountain.** Ensure that the high-pressure 90°-swivel adapter is attached to one end of the fountain bar, usually to the 3/8" half-collar. Ensure that the flush plug(s) are in place and tight opposite the ink inlet. Once the bar is positioned correctly, tighten the sensor bar bracket and the cheek plate bracketing (including the vertical tabs setscrew) to secure the bar in the fountain. Repeat with each fountain that is to be outfitted.





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4. Connect the Actuator/Ball valve assembly to the ink drop line. Consult page 8 of this manual for recommendations regarding supporting the actuator/ball valve/control box assembly (2-piece) if this option is chosen. If the control box is provided without the bracketing to connect it to the actuator/ball valve assembly (3-piece), locate the control box within 6 feet of the fountain to be controlled. The sensor comes equipped with 2 meters (6 feet) of cabling for both sensor and power. In either case, the control box must be located close enough for the 2 meter sensor cable to reach it.
5. Run compressed air to the 1/4" tubing inlet on the control box. In the case of the 3-piece configuration, additional tubing will need to be run from the control box "air out" to the actuator/ball valve assembly. In the case of the two piece design, the tubing connection is made at the factory.
6. Connect the high-pressure ink hose to the actuator/ball valve assembly. The pipe size of the ball valve is 1/2" NPTF. Connect the 1/2" NPT end of the ink hose to the ball valve and connect the other end (3/8" NPT) to the hydraulic quick disconnect socket.
7. Connect the hydraulic quick disconnect plug to the 90° swivel adapter. Ensure that the connection is tight. Connect the hydraulic socket to the hydraulic plug.
8. Plug the control box into a standard 120 VAC outlets to supply electrical power to the system.



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System Operation

The operating principle of capacitive proximity switches is based on a damped RC oscillator with a floating base electrode (an open capacitor with only one electrode). The active zone is the electrostatic field generated by the oscillator circuit in front of the base electrode. The interference by an object brought into the active zone causes oscillation to begin. The oscillations are decoupled and rectified, and the trigger circuit subsequently detects a certain current level and drives the output stage. The decoupling stage also generates a negative feedback signal, which opposes the start up of oscillations.

The potentiometer allows adjustment of the negative feedback and in this way determines the sensitivity of the capacitive proximity switch.

The electrostatic field can be influenced in 3 different ways, for the purposes of this discussion we'll concern ourselves with one:

- Non-conductive materials (Glass, plastics, ink.....) will change the dielectric characteristics of the active zone and cause oscillation to begin, however the effect on the electrostatic field produced by a non-conductive material is generally marginal, and consequently, the practical sensing distances are relatively short

When the yellow push button is pressed, a solenoid is manually activated and routes air to the actuator/ball valve assembly. The button is spring loaded so that when it is released the button's electrical contacts are broken.

When the leveler control box is switched to "auto", the proximity sensor acts as the "on/off" switch for the solenoid. When the level of ink in the fountain drops sufficiently to move away from the active zone of the proximity sensor, the dielectric constant is changed and the sensor triggers it's output, energizing the solenoid and opening the actuator/ball valve assembly.

It is advisable to use the manual position as a test measure to ensure all connections are tight and leak free. Make any final adjustments to the sensor and/or bracketing etc. at this time. Adjust the physical height of the sensor in the mounting bracket before adjusting the potentiometer for adjusting the sensing distance to the ink. This is accomplished using the two nuts on the sensor itself. The sensing distance is adjusted by using the small regular screwdriver provided with the



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sensor and inserting it into the sensor adjustment screw on the top of the sensor. The sensor is adjusted to its maximum sensing distance at the factory (see sensor documentation).

F A Q (Frequently asked questions)

- Q. Can this system work on older press lines?
A. Yes, this system is easily adaptable to almost any pressline and fountain configuration.
- Q. What is the sensing distance of the capacitive sensor?
A. The sensor is set at 7/8" usable distance. There is a potentiometer adjustment to adjust this distance. The maximum sensing distance is approximately 1"
- Q. What is the power requirement of the system?
A. 120 VAC
- Q. What is the air pressure requirement?
A. 80-120 PSI
- Q. Is the fountain bar installation complicated?
A. No, the Talon-Grip™ Hardware is clamp on. It slides over the cheek plate and is secured with a setscrew. All that is required is an Allen Wrench.
- Q. Can one unit be used with several colors?
A. No, unless the fountain bar, hose, fittings and ball valve are **completely cleaned out** first. The control box and sensor are not color sensitive.
- Q. What type of fluid pressures are common with this system?
A. The leveler does not generate pressure. The pump that supplies the ink to the system is the source of the fluid pressure. The most common pressures in systems of this type is between 1,000 and 2,000 PSI. The ball valve is rated at 3,000 PSI.



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- Q. The ball valve is rated at 3,000 PSI, what if my pump develops more pressure than that?
- A. The 3,000 PSI rating is the rated working pressure. OSHA directs that, for safety reasons, all pressure rated valves pass a burst test of at least 4 times the working pressure. In this case, the burst point would be in excess of 12,000 PSI.
- Q. Are there any user serviceable parts?
- A. No, the unit is modular and replacement components are available. If defective parts are discovered in the control box, it is suggested that the entire box be replaced.
- Q. We use two way radio communications in our plant. Would that interfere with the operation of the system?
- A. The proximity sensor is triple-shielded to resist radio interference.
- Q. What is the warranty?
- A. The equipment carries a standard manufacturer's one-year warranty. The sensor carries a lifetime warranty for standard use to the original purchaser.
- Q. Is the sensor resistant to ink?
- A. The sensor body is impact resistant plastic with stainless steel housing and is waterproof. It is also chemical resistant. It is strongly suggested that the sensor be routinely cleaned with a ***mild diluted*** solvent to prevent damage and ensure satisfactory longtime operation. Prolonged exposure to solvents of any type could damage the unit and void the warranty.
- Q. Can this system be used on sheetfed presses?
- A. Yes, this system is in wide use in the sheetfed community
- Q. What is the fountain bar made from?
- A. Schedule 80 anodized aluminum pipe. There are 1/2" NPTF ends and a 3/8" half collar welded on to allow an inlet for the ink. Also, there are 1/8" NPTF holes to allow an outlet into the fountain. The Talon-Grip™ hardware and sensor brackets are milled from aluminum and anodized to resist corrosion.