

IOM

INSTALLATION OPERATION
& MAINTENANCE

BATCH CONTROLLER

72100-00





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CAUTIONS — READ FIRST!


READ THESE WARNINGS AND SAFETY PRECAUTIONS PRIOR TO INSTALLATION OR OPERATION. FAILURE TO COMPLY WITH THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.


 **WARNING** Prior to servicing the pump and controller, ensure that the air and fluid lines are closed and disconnected. While wearing personal protective equipment, flush, drain and process liquid from the pump in a safe manner.


 **WARNING** When removing the end cap using compressed air, the air valve end cap may come out with considerable force. Hand protection such as a padded glove or rag should be used to capture the end cap.


 **CAUTION** Use caution when mounting the cycle counter in areas where wash down occurs.

 **CAUTION** For the speed controller, do not use zero as a speed and always observe signal polarity and current limits.

 **CAUTION** Disconnect all power sources before opening control module.

 **WARNING** This product can expose you to chemicals including Nickel, Chromium, Cadmium, or Cobalt, which are known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

 **WARNING** = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage

 **CAUTION** = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

PRINCIPLES OF OPERATION

72100-00 BATCH CONTROLLER

The 72100-00 controller works by adjusting the time interval between the signals sent to the solenoid controlled AODD pump. These signals dictate when the pump will discharge one of the fluid chambers of the pump. This discharge of a single fluid chamber is referred to as a "stroke". The 72100-00 controller is engineered to provide speed control of a solenoid-controlled pump that is linearly proportional to a 4-20 ma signal. The signal can be set to have a speed range of 1 to 499 Strokes/Minute.

You must use the appropriate pump solenoid when using a 72100-00 controller. The system requires 110 volts AC to power it and delivers 12 volts DC to the pump solenoid. The system can be operated using the toggle switch on the cover of the unit or by connecting a "SPDT center-off" switch (or a set of dry-contacts) remotely. The connections for remote usage are a terminal strip, also on the circuit board. The system uses Strokes/Minute units which are very useful in estimating fluid delivery rates and permit linear calculations.

ALL-FLO'S SOLENOID CONTROLLED PUMPS

All-Flo's solenoid pumps use the compressed air to displace fluid in the same way as a standard Air Operated Double Diaphragm (AODD) pump while using electric pulses to control the pump speed. The use of a solenoid pump allows the user to have more control over the operation.

The solenoid pump uses an electrical pulse to energize the solenoid valve attached to the air end of the pump. These electronic pulses are sent in the form of a square wave (Figure 1).

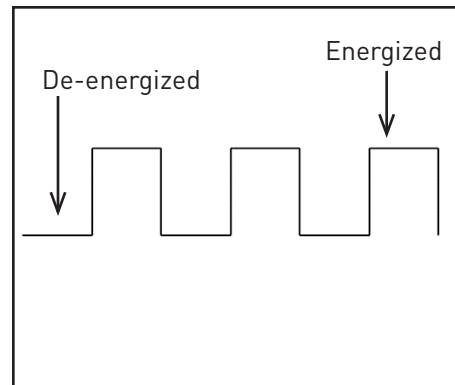
The energized pulses move the solenoid valve connecting the different ports changing how the air flows. In Figures 2 and 3, port 1 denotes the connection to the air supply, ports 2 and 4 denote the ports leading the air chambers, and ports 3 and 5 denote the ports that are open to the atmosphere.

While the solenoid is de-energized, the valve sits at its standard position, allowing pressurized air from the air supply (port 1) into one of the air chambers of the pump (port 2). The other air chamber (port 4) is connected the exhaust (port 5), discharging any pressurized air in that chamber.

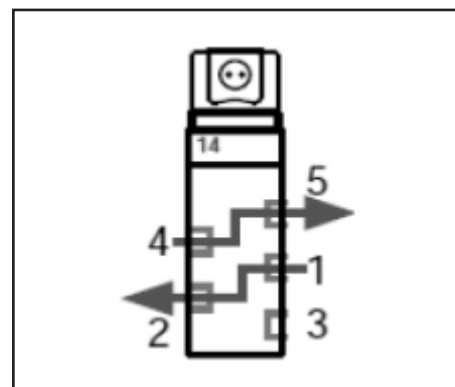
When the pulse is received, the solenoid energizes and moves the valve to its energized position (Figure 3).

While the solenoid is energized, the pressurized air from the air supply (port 1) flows into the air chamber of the pump (port 4). The other air chamber (port 2) is connected the exhaust (port 3), discharging any pressurized air in that chamber.

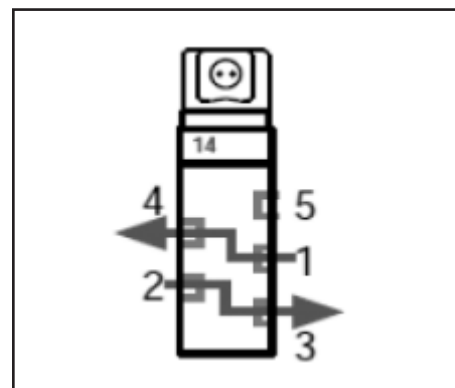
This pulsating energized and de-energized states mimics the air flow cycle cause by the pilot sleeve in the standard pump. The faster these pulses are applied, the quicker the pump operates.



**FIGURE 1
SQUARE WAVE**



**FIGURE 2
DE-ENERGIZED
SOLENOID POSITION**



**FIGURE 3
ENERGIZED
SOLENOID POSITION**

INSTALLATION

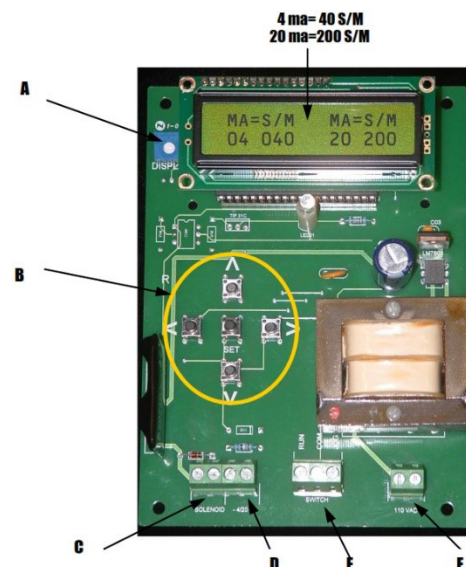
72100-00 BATCH CONTROLLER

The 72100-00 controller requires 100 volts AC (220 volts AC is also available) to power and it delivers 12 volts DC to the pump. The appropriate 12-volt DC solenoid pump is needed to be used with this controller. This system is programmed using the keypad on the cover and can be remotely paused or stopped using dry contact via a Switch terminal on the circuit board.

This controller should be mounted close to pump in a dry and safe place. The enclosure is NEMA 4X, but All-Flo advises to avoid hosing the unit. The unit always comes up in a 4-20 mode and is ready to run seconds after power is applied.

INTERNALS

- A. The Display control changes the contrast on the LCD display. You will probably never touch it unless the temperature around the unit is unusually high or low. If there is no information on the display, someone probably fiddled with the control. Just bring it full counterclockwise and then back off until you have the desired contrast.
- B. The Setup Keypad has the Set key in the center and four keys with arrows around it. They are for right, left, up and down. The right and left move the cursor on the display accordingly and the up and down change the values highlighted by the cursor accordingly. They are only used to set the unit up. Once you have "dialed in" the unit, you probably won't be using them and they are inside the unit, out of harm's way.
- C. The Solenoid output provides 12 volts DC for the pump's integral solenoid. You must use the correct pump solenoid for the pump to operate properly.
- D. The 4-20 ma input gets hooked into the control loop. You must observe the proper polarity for the controller to work properly and to protect it from damage. If you connect the 4-20 input to a current source of greater magnitude you may damage the A/D converter in the system so pay attention the maximum current in the loop.
- E. The Switch terminal connects the control switch to the system. If the Run terminal (blue wire) and the Common terminal (black) are connected, the system reads 4-20 ma. If the Jog (yellow) and the Common (black) are connected, the system will run the pump at the average of the high and low speeds programmed. Never connect all three wires together; you won't hurt anything, but you will confuse the processor and the system won't function properly. You can disconnect the unit's switch and connect any dry contact set that can function as a SPDT switch. So, relays, switches and even PLCs are possible as control devices.
- F. The 110 VAC input is the only way to power the standard unit (220 VAC and 12 VDC versions are available by specifying) Just make sure the connections are neat and that for safety reasons no conductor is exposed. This is the only location on the circuit board where more than 12 volts is present.



BATCH SET UP

72100-00 BATCH CONTROLLER

1. Hit the Set button to enter Setup mode and then adjust the values and move the cursor (using the left and right arrow buttons) and raise or lower the values (using the up and down arrow buttons) until you have all the values where you want them.
2. Hit the Set button again to get out of Setup mode.
3. The practice of using the 4-20 Signal to Stop the Pump should Be set Using 4ma as "off" By default and 5ma as the slowest Speed or 20ma as "off" in the reverse setup. Putting a zero as a speed can sometimes create math problems for the processor.
4. The System is now ready to Run (or Jog).
5. The sensor supplying the loop current, the 72100-00 unit, the pump, and even the fluid ("heads" And viscosity) and the air supply to the pump all have tolerances on their performance. The exact flows will need to be dialed in.
6. To run the system, flip the switch to the right. The display will tell you the loop current and the pump speed.
7. To run the pump, to purge it, prime it, or simply to pump a little product; flip the switch to the left. The unit will display the pump speed which is the average of the setup high and low speeds.

NOTE: DO NOT USE ZERO AS A SPEED & ALWAYS OBSERVE SIGNAL POLARITY & CURRENT LIMITS

CALCULATING VOLUMETRIC DELIVERY

The pump manufacturer supplies information about the delivery of fluid per pump stroke (emptying of one chamber), but factors like inlet and outlet head, inlet air pressure and flow delivery, viscosity and cavitation all effect the volumetric flow. Dividing the desired flow rate by the displacement per stroke will provide the estimated desired pump speed. Since there are many factors that can change the displacement per stroke, the exact speed will need to be dialed in.

SPECIFICATIONS

72100-00 BATCH CONTROLLER

Dimensions:	6-2/4" Height x 4-3/4" Width x 2-1/4" Depth
Weight:	1-1/2 lbs
Enclosure Construction:	NEMA 4x with Sealing Gland for Cable and Boot for Switch
Power Consumption:	12 Watts
Voltage Requirement:	120VAC
Voltage Output (to Solenoid):	12VDC 750ma Maximum (the pump's solenoid must operate on 12VDC)
Operating Temperature Range:	40°F to 100°F
Speed Range:	0 to 499 Strokes/Minute
Number of Batches:	Three separate, plus a "Constant Run" preset



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All-Flo is committed to the pursuit of designing and manufacturing the highest quality product available to industry. Since the beginning in 1986, All-Flo engineers have used their extensive knowledge of today's engineered materials, advanced air system logic and manufacturing techniques to develop the superior group of lube-free, air-operated diaphragm pumps found in this catalog. Every pump is performance engineered and quality built to provide trouble-free service under the toughest conditions.



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