Operation and Maintenance Manual
For All Variations of:
AP200G2–G4, AP200F2–F4

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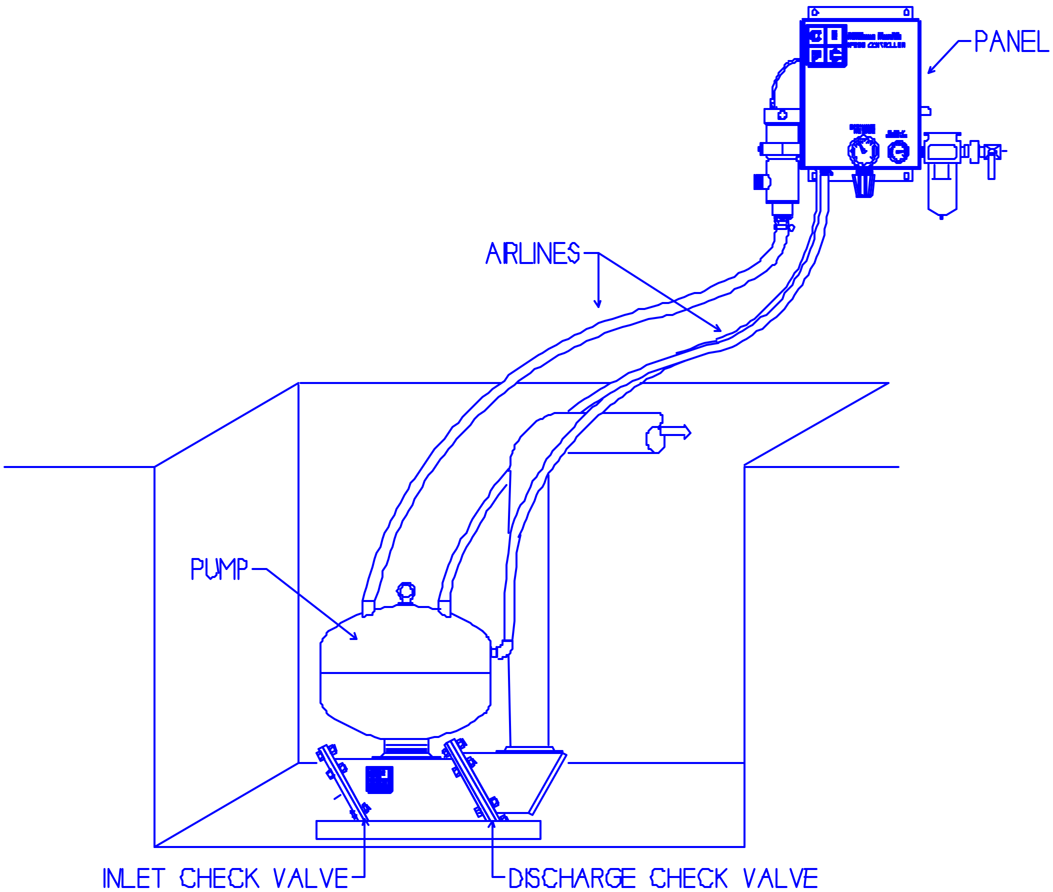
SYSTEM OVERVIEW

Each **PITBULL®** pumping system is comprised of a pump with two check valves, a control panel, and airlines to communicate between the pump and its controls. The control panel and airlines are provided loose and are connected at time of installation.

*** The airlines are (3) different sizes.

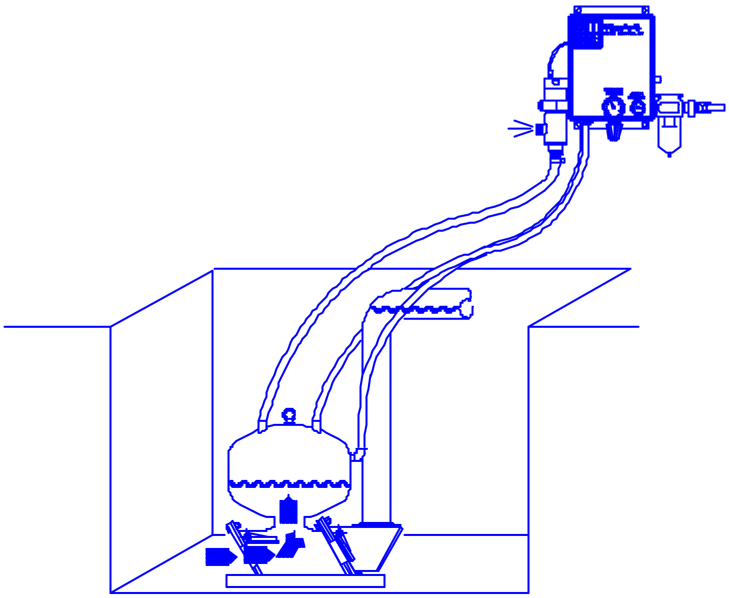


THE PITBULL® PUMPING PRINCIPLE

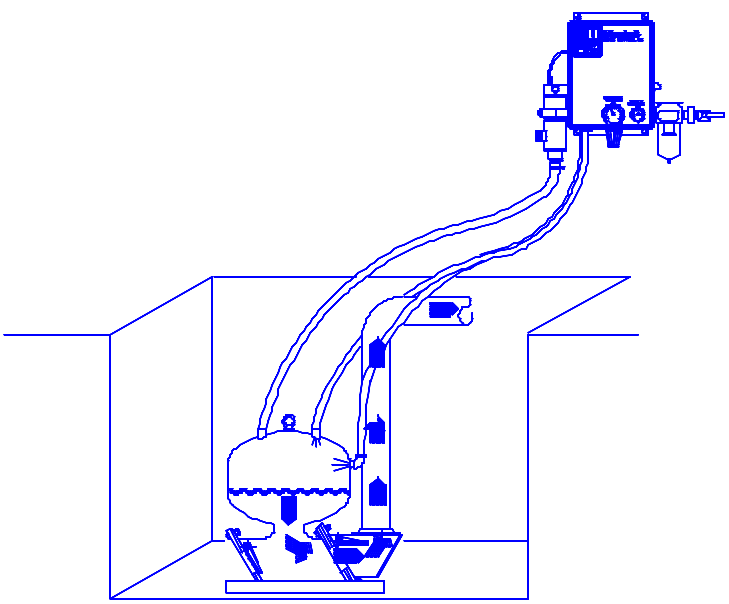
The pump moves liquid by allowing liquid to fill the pump through the inlet check valve, and then when full, it pressurizes with compressed air and forces the liquid out through the discharge check valve. The check valves direct the liquid in the correct direction.

In its standard configuration the **PITBULL®** uses gravity to fill the pump, requiring the pump to be below the liquid level in order to fill. The pump will begin cycling when liquid covers its top. This level is the 'shut-off' level. The unit will pump any liquid entering the sump once this level is reached.

Pump is shown filling through inlet check valve. When liquid reaches the side fitting, the pump will go into the discharge stroke. The discharge check is held closed by liquid trying to re-enter the pump.



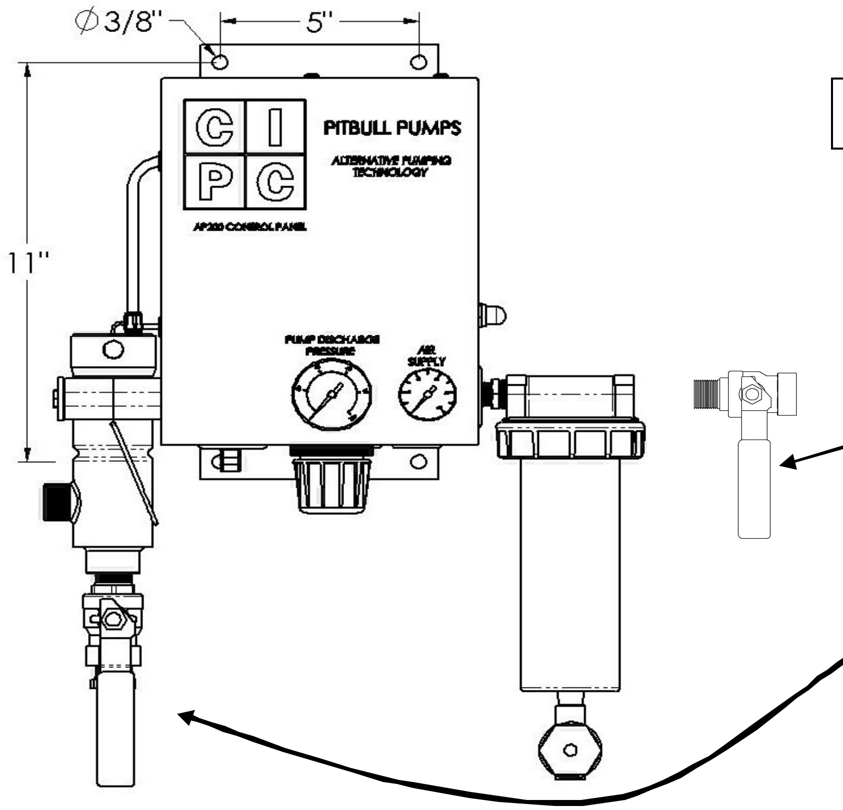
Pump is shown pressurized, forcing liquid out of the discharge check valve. The inlet check is held closed by the internal pump pressure.



INSTALLATION

CONTROL PANEL MOUNTING

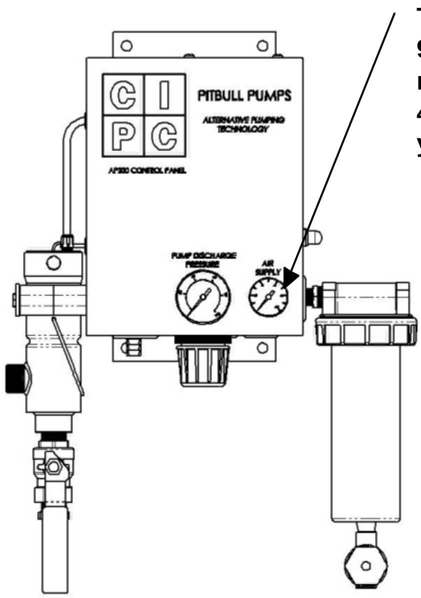
Below are the bolt hole locations for the AP200 control panel. Please read the table below for correct sizing of the air supply and note piping recommendations.



AP200 for 2, 3 & 4 pumps

A ball valve can be installed ahead of the panel as an isolation valve for panel servicing. **<u>DO NOT USE THE AIR SUPPLY TO TURN THE PUMP ON AND OFF.</u>**

<u>For ON/OFF control</u>, use the 3/4" ball valve on the bottom port of the exhaust valve. When closed, the pump cannot fill or cycle and is effectively 'OFF' without allowing fluid up the sensing lines.



This supply gage may read 90 psi when the pump is at rest, but if it drops below 40 psi during discharge your line is way too small.

Air supply to the panel: IMPORTANT!
Follow these sizing recommendations for standard conditions. Because the **<u>PITBULL</u>®** <u>consumes air in short bursts and not in steady flows, the air supply must be sized for the 'burst' flow rate, not the averaged flow rate.</u>

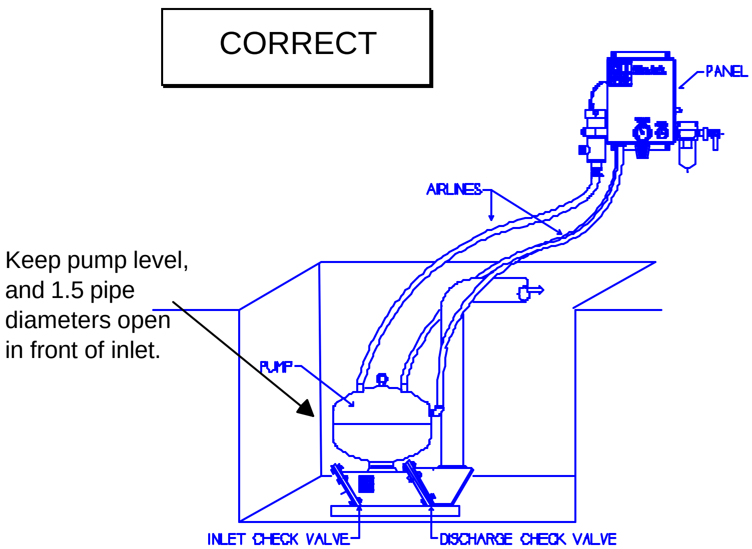
Model #S2 1/2" pipe (>1/2" ID)
Model #S3 1/2" pipe (>1/2" ID)
Model #S4 3/4" pipe (>3/4" ID)

CIPC recommends that you install an air filter with range of 40-80 micron filtering capacity ahead of the panel (in addition to the filter/autodrain provided) if service air is bad. If the potential exists for slugs of water in your airline, install a water trap device. **<u>Do not lubricate the air!!</u>**

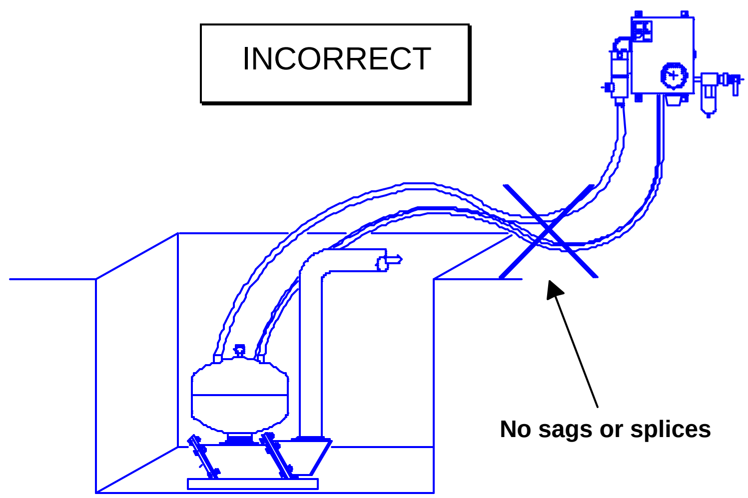
INSTALLATION - PUMP AND PIPING

Location: The panel should be located in the vertical position, above the elevation of the top of the pump. There must be a height difference so that the airlines between the pump and panel can be **pitched towards the pump.**

Airlines between the pump and control panel:



IMPORTANT! You must locate the lines so that they are pitched downhill from the panel to the pump and trim any excess length. This assures no moisture will collect in **<u>loops or low spots</u>** that could throw off the panel's sensing ability. **<u>DO NOT SPLICE THE AIRLINES!!</u>** (The restriction will throw off panel function. Get longer, continuous hoses if required). See diagram.



<u>Hardpiping the control lines:</u>
If you cannot use the lines that were provided with the system you must follow the rules below;

Replace 3/8" hose with 1/4" pipe or 3/8" OD tubing.
Replace 1/2" hose with 1/2" pipe or 5/8" OD tubing.
It is critical the above sizing is followed on those (2) lines!

Replace 3/4" hose with 3/4" pipe or 1" tubing.
Replace 1" hose with 1" pipe or 1-1/4" tubing.

INSTALLATION: PUMP AND PIPING CONTINUED

Submersed: The pump must be placed on a level surface as it **must be approximately level** to operate correctly. Try to keep at least (1.5x) pipe diameters of open space in front of the inlet to allow full flow to the pump (see sketch on page 5).

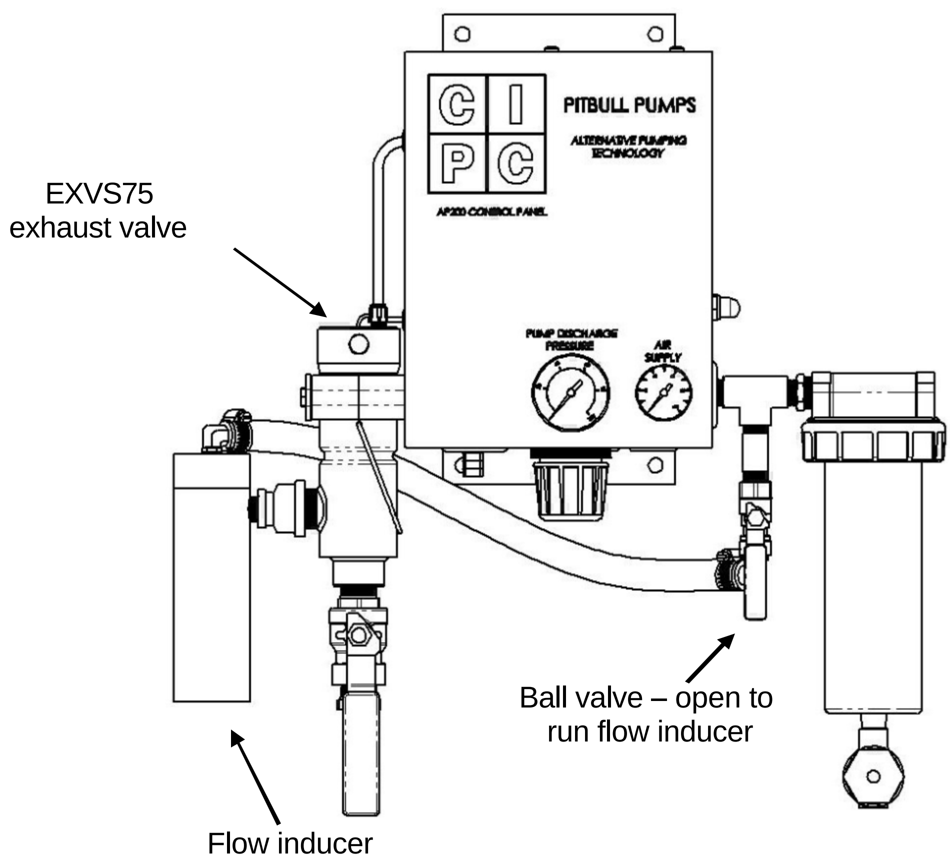
Discharge piping: Match your discharge piping to the size of the pump's discharge piping for best results. **Reduced discharge piping results in higher velocities, higher discharge head, greater wear and tear, and the possibility that the pump will pass something that will get caught in the discharge piping.** To save space, see the following diagrams for optional piping configurations. If the pump supplied cannot be made to fit your site, contact the factory for a custom fabricated pump.

FLOW INDUCEMENT

The flow inducer is an added option, which gives the pump the ability to created suction at its intake. **Flow inducement is not used for suction lift, but to help pull material into an already submersed pump**.

Operation: Located on the right side of the control panel (when facing panel) is a ball valve mounted on a vertical down-leg off of the air supply to the panel. When opened, this ball valve will supply compressed air to the flow inducer (mounted on the exhaust valve on the left side of the panel) and the inducer will suck air out of the top of the pump, pulling liquid in through the intake.

When to use: Turn on the flow inducer any time you need to pull the pit down to the pump intake, usually to expose settled solids, which you can be resuspended using a washdown hose. The inducer can also be used to pull heavy solids into the pump that won't quickly flow in by gravity.



Installation in ‘Dry-Piped or Transfer Mode

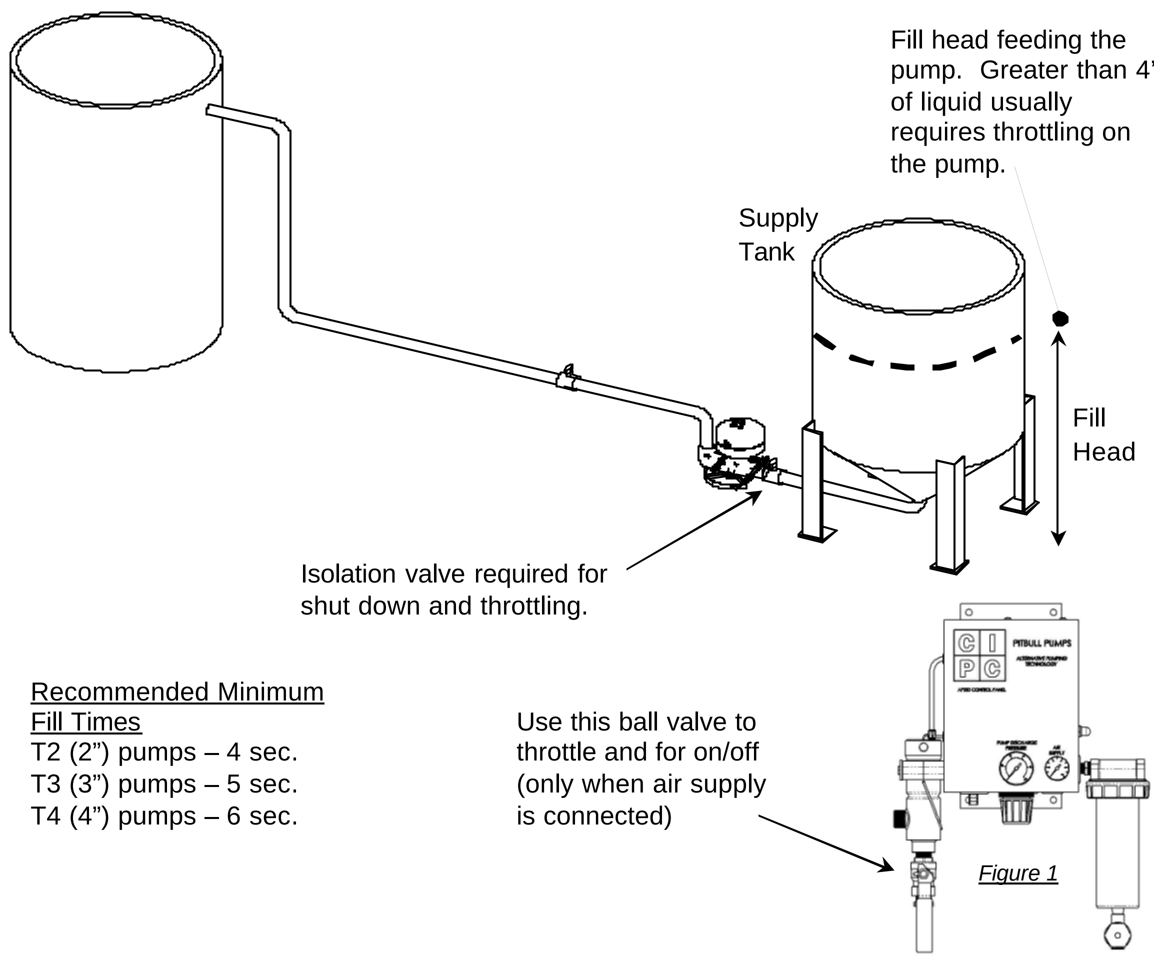
The ‘T’ series of pumps have adapters on the inlet to allow for piping connections. These pumps operate identically to the submersible pumps and are virtually identical in construction and parts. However there are a few, critical concerns when applying the **PITBULL®** pump with AP200 controllers in this type of service.

Install- follow the same procedures for airlines, panel mounting, airline connections as the submersible. If possible, try to mount control panel above the maximum liquid level in the supply tank. If not possible pay particular attention to the ‘Shut-down Procedure’ following.

Fill Head (critical)- This is the positive head feeding the pump. When greater than 4 feet, the pump can fill faster than it’s designed for and liquid can spray from the exhaust. If the ‘fill’ portion of the pump stroke falls under the recommended time, increase the filling time by partially closing the isolation valve on the inlet, or partially closing the ball valve (provided) just below the exhaust valve (see figure-1).

Shut-down Procedure (critical)- Do not cut the air supply to the panel without first closing the inlet isolation valve. Allowing fluid pressure/flow into the pump without the air ‘on’ will flood the panel as well as the floor with your liquid. This can make the panel inoperative and require significant cleaning and/or service.

1. Close off the inlet supply.
2. Manually override the pump to blow the chamber down and then close the exhaust ball valve as an extra precaution.



Recommended Minimum Fill Times
T2 (2”) pumps – 4 sec.
T3 (3”) pumps – 5 sec.
T4 (4”) pumps – 6 sec.

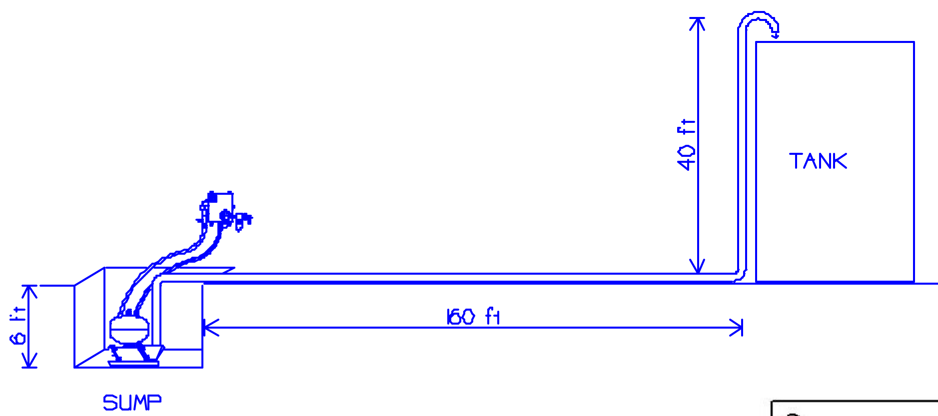
Figure 1

STARTING UP THE PUMP

The **PITBULL®** uses two distinct strokes to perform its pumping action; the fill stroke and the discharge stroke. Filling the pump is largely controlled by nature (gravity), and proceeds at a rate dependent upon the depth of the liquid. However, it is required that the user control the discharge conditions. Following are the steps to correctly set up the pump's discharge stroke.

The pump needs two things to discharge its contents: 1) time, 2) pressure. The time is factory preset and rarely needs resetting. The pressure may need to be adjusted by you.

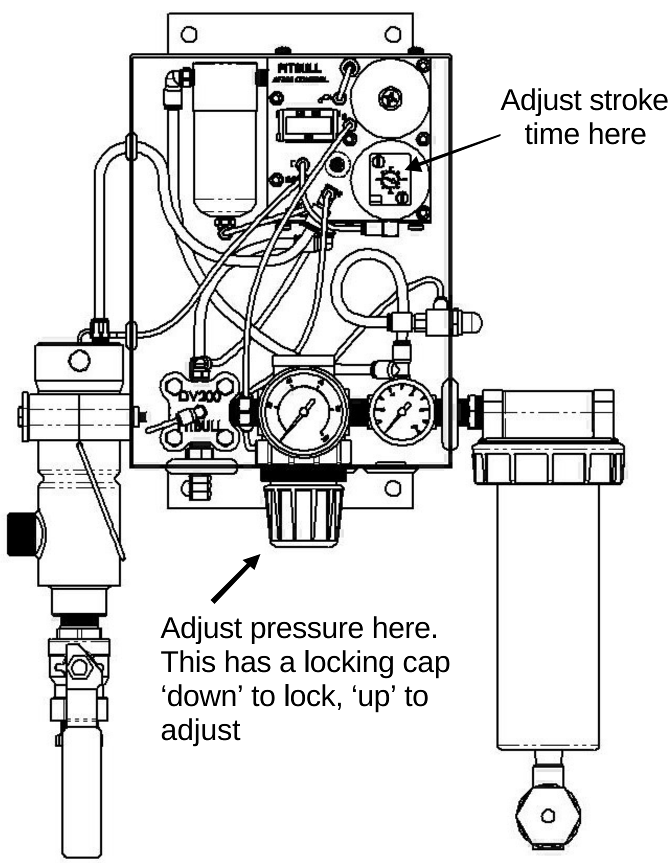
<u>Set the pressure.</u> Try to determine the total dynamic head required for the application. In simple terms, take the vertical height the pump must push the liquid and convert it to psi (there are 2.31 ft per 1 psi), and then add in your calculated or 'guesstimated' friction loss (guess high if the liquid is viscous) in psi, and finally add 15 psi for a safety margin. This total should be enough to push the liquid out of the pump at a good flow rate. Note: By using too little pressure nothing will discharge (the pump is essentially deadheaded), too much pressure and you waste compressed air and put extra wear on your check valves. **Example:** The pump is in a sump 6' deep, and must pump to an elevated tank 40' above grade, through 200' of 2" pipe at an average flow rate of 20 gpm.



The elevation difference is 6' + 40' = 46' and 46/2.31= 20 psi. Now, the flow rate was said to be 20 gpm, but the **PITBULL®** has separate fill and discharge cycles and therefore *<u>to put out a 20 gpm flow rate the pump must take in 40 gpm while nothing is discharging, and then discharge at 40 gpm while nothing is filling to pump to average the 20 gpm.</u>* So, use 40 gpm to calculate friction loss.

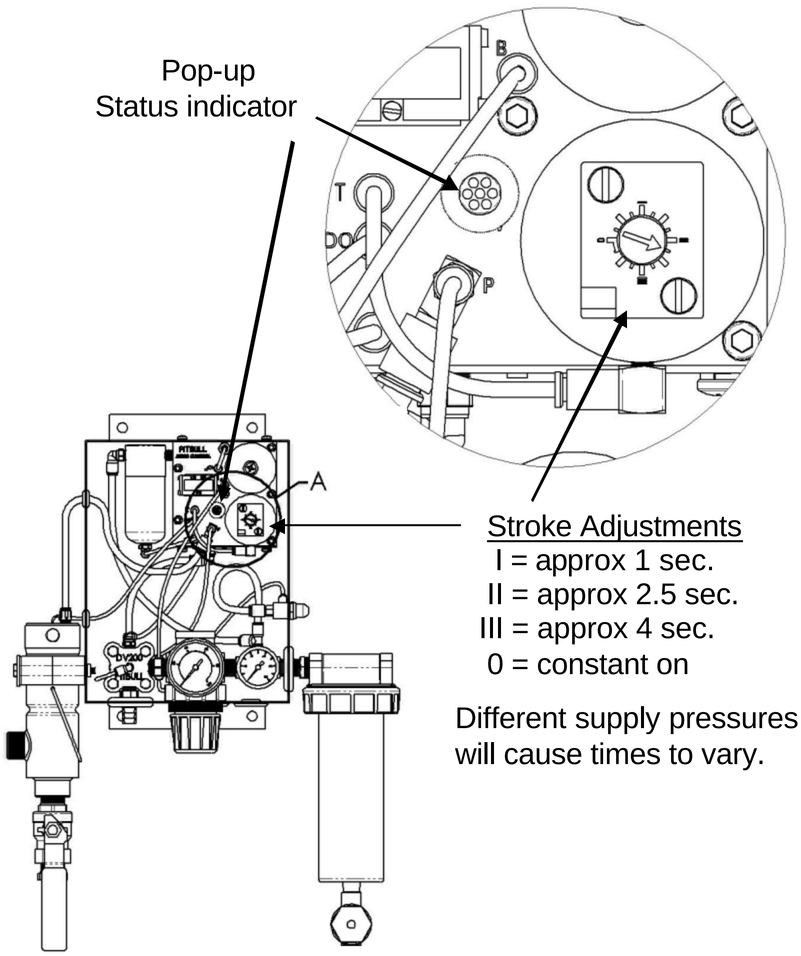
TIP: If your discharge piping size is the same as the **PITBULL®**, the velocity will be so low that friction loss is negligible on shorter runs with watery fluids.

Finally, from a friction loss chart you find that the loss for 40 gpm of water flowing through 200' of 2" pipe is 3.6 ft/100', or a total of 7.2' (3.1psi). So set the discharge regulator for 20 + 3.1 + 15 = 38.1 psi; 40 is close enough. (Note that the friction loss was small)



STARTING UP THE PUMP CONTINUED

<u>**Set the discharge time**</u> ***(most submersed pumps will not require adjustment, and are factory pre-set).***
The control panel has a screwdriver slot adjustment for the discharge stroke. The position of the arrow only approximates the discharge time.... **USE YOUR WATCH WHEN FINE TUNING THE STROKE**.
S2 set to 2 seconds, S3 set to 3 seconds, S4 set to 3.5 - 4 seconds,



Different supply pressures will cause times to vary.

IF YOUR PUMP HAS 100' + OF DISCHARGE LINE, you may need to lengthen the stroke (your pump will take longer to discharge than the standard submersible)

These settings should discharge most, if not all of the pump's contents in medium and low head applications on watery fluids**. <u>More time will be required for long pipe runs and thicker fluids.</u>** More importantly, these are good starting points, and the pumps are factory set for these respective discharge times and the regulators are set at 40 psi prior to shipment. <u>The slot will rotate completely around, allowing adjustment between approx. .25 and 8 seconds.</u>

Fine tuning pressure and discharge strokes ***<u>(usually not needed):</u>*** To understand what pressure is needed, **watch the discharge gauge.** While the pump is filling, no air flows and the gauge will show whatever pressure you set it for. But during discharge, the gauge will fall to the dynamic discharge head and hold there while the contents are discharged. If you are not using enough pressure, the gauge will initially fall as the pump pressurizes and then it will return to within a few psi of the initial setting (deadheaded).

Optimally, the pressure during discharge should be the '10-15psi safety margin' below the setting on the gauge and this is how you know liquid is discharging out of the pump at a good rate. **No flow=No pressure drop on the gauge.**

The gauge can also be used to detect an excessively long discharge stroke in most cases. When the pump contents have been fully discharged, compressed air will begin escaping down the discharge line. As the discharge piping fills with air, the discharge head is reduced and you will see a drop in pressure on the discharge gauge.

The sequence will occur as follows; first the gauge drops quickly from its static setting as the pump is pressurized. Then the pressure settles in at the discharge head pressure (as liquid is forced from the pump). Finally, as air enters the discharge piping, the pressure drops again, further giving indication that the discharge time is too long. Also, it is easy to detect air in the discharge piping by placing a hand on a discharge piping elbow. The turbulence caused by the air is pronounced and the shift from liquid discharge to air discharge can be felt. Shorten the discharge time incrementally until this turbulence goes away.

TROUBLESHOOTING THE PUMP

THE MOST COMMON PROBLEMS **DURING START-UP**

If you are having difficulty with the operation of your pump please review the following list of pump problems. This list contains the most common problems we get calls on and also represents a group of avoidable conditions

1) Rust, scale, water slugs in the air supply fouling the regulator/valving because of no filtration or not blowing down the air supply until clear, prior to connection.
2) Cycling problems due to improper layout of the airlines, with low spots, crimps, splices or incorrect hardpiping substitutions.
3) Erratic cycling due to a small diameter air supply that can't deliver the volume while maintaining pressure. 'Supply' pressure gauge falls below 40 psi during discharge stroke.
4) Pump cycles slowly because of a restriction in the exhaust path (muffler, looped line etc.).
5) Poor setting of the discharge pressure and/or discharge time for the conditions. Stroke and/or pressure are way off, usually from being adjusted without reading how-to/why first.
6) Exhaust splatter and fouling due to >6' liquid above pump without the inflow being throttled (4 sec min fill time).
These conditions are all covered in the installation and start-up of the pump. If you are having one of these problems, and particularly if you have recently installed the pump, please review the earlier portions of the manual for correcting the condition.

Given that the preceding section does not address your pump's condition, we suggest the following process of test/evaluation/elimination to arrive at the source if the problem with the least amount of servicing.

CHECK VALVE PROBLEMS (see diagrams on next page)

Inlet check valve:

If the inlet check valve is blinded, blocked or stuck closed, the pump will cycle very slowly or not at all because the pump is not getting full enough to initiate a discharge stroke.

If the inlet check valve is stuck open, the pump will appear to cycle normally, but the discharge flow rate will be reduced or non-existent. On a submersed application you will commonly see turbulence at the inlet (from liquid and possibly air being expelled from the intake). On a dry piped pump you may be able to detect a lack of slamming, as the inlet check doesn't close at the beginning of the discharge stroke.

Discharge check valve:

If the discharge check is plugged or stuck closed, the pump is deadheaded and will have a very short fill cycle (because nothing left the pump, the panel immediately initiates another discharge stroke). Because no liquid is leaving the pump, you may also get liquid spraying from the exhaust.

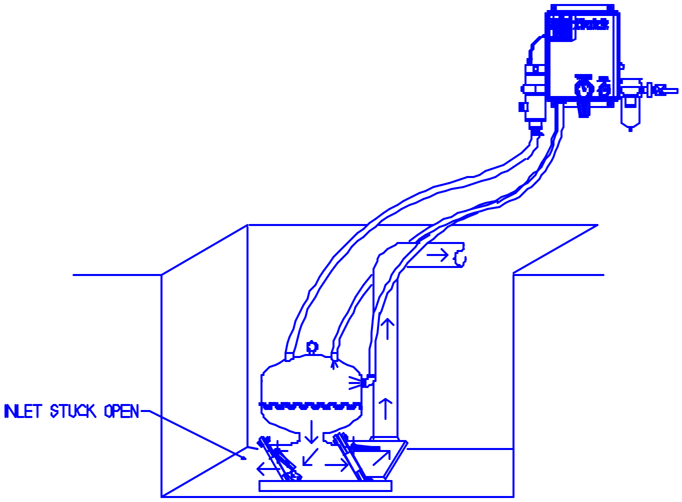
If the discharge check is stuck open, the pump will cycle normally, but flow will be much less as liquid runs back into the pump from the discharge piping. On a dry piped pump you can close the inlet isolation valve, and then if the pump continues to cycle the discharge check must be open.

BASIC LIQUID-END PROBLEMS (see diagram on next page)

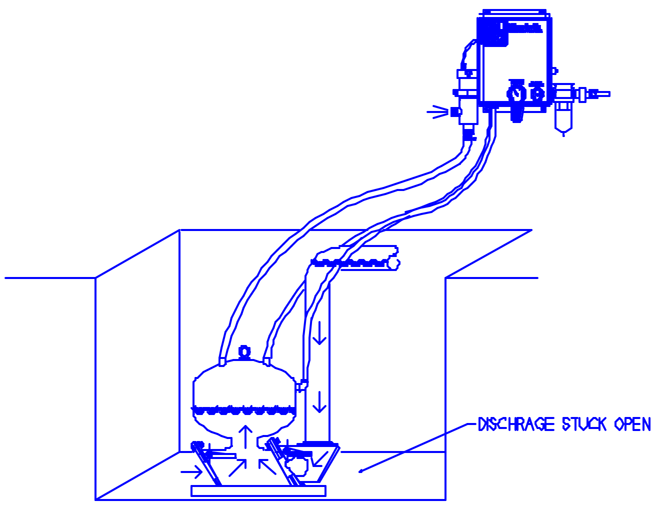
The pump will not cycle if the inlet is blocked, or if for any other reason there is not enough liquid at the inlet to fill the pump up. The pump does not have any suction at its inlet unless you have one equipped with the self-priming or flow inducement option.

There are two ways to deadhead the pump. The first is the obvious case of blocked discharge piping in which the pump will cycle erratically and have a very short (fraction of a second) fill stroke, and probably spray liquid from the exhaust. The second case is not having or using enough air pressure, and the symptoms are identical. Your discharge gauge will always confirm a deadheaded condition when the pressure level during discharge is equal to the pressure setting (i.e.; no pressure drop).

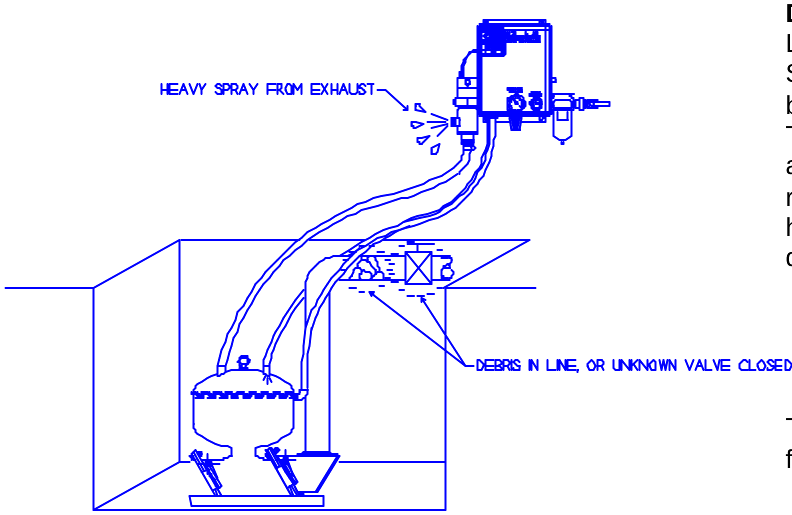
COMMON CHECK VALVE AND PIPING PROBLEMS



Inlet check valve is stuck open by debris or is mechanically frozen.
Liquid will be pushed both directions, up the discharge and back out through the inlet. The pump will continue to cycle, and may have some output capacity.... But there will be an unmistakable turbulence coming from the inlet on each stroke (that the inlet is open) and this is usually accompanied with air 'rolling' the liquid surface.



A discharge check stuck or held open is fairly subtle. The pump will continue cycling and may appear normal.
The clue will be a low net flow rate out of the sump.
Also, the vent may seem significantly stronger due to the pump filling from both directions.



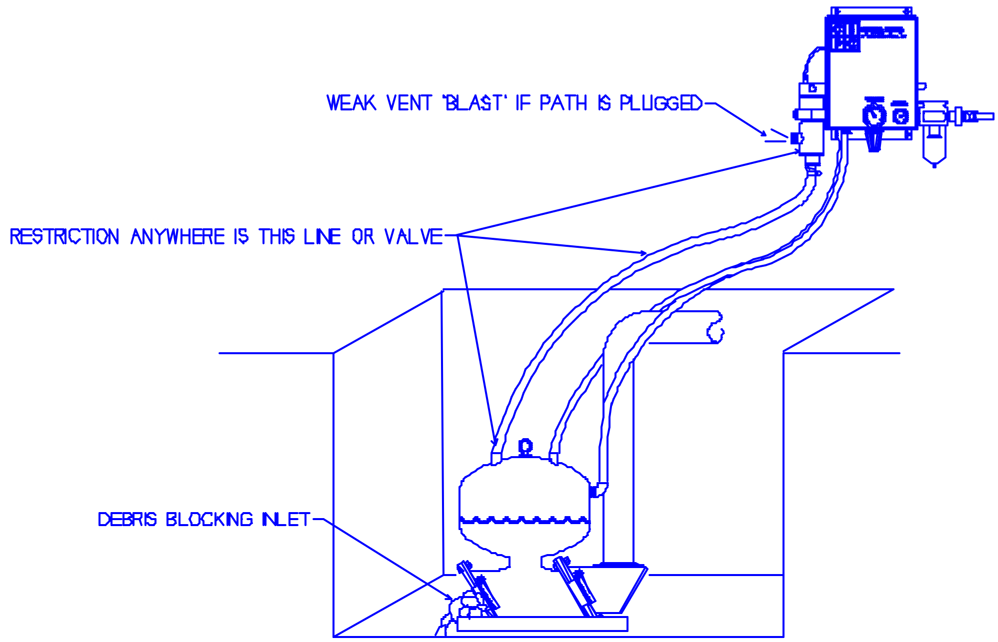
Deadhead.
Lots of clues to find this one.
Spray is likely to be coming out the exhaust because the pump is always full.
The discharge gauge falls only for a moment, and then returns to it 'fill' mode setting. If you raise the regulator setting, the same thing happens at the new setting (no pressure drop during discharge = no flow out of pump).

The 'fill' time is very short...the pump is already full because no liquid was pushed out.

COMMON CHECK VALVE AND PIPING PROBLEMS CONTINUED

Look for any of these conditions if the pump cycle rate has slowed or stopped when there is ample liquid depth to be cycling the pump.

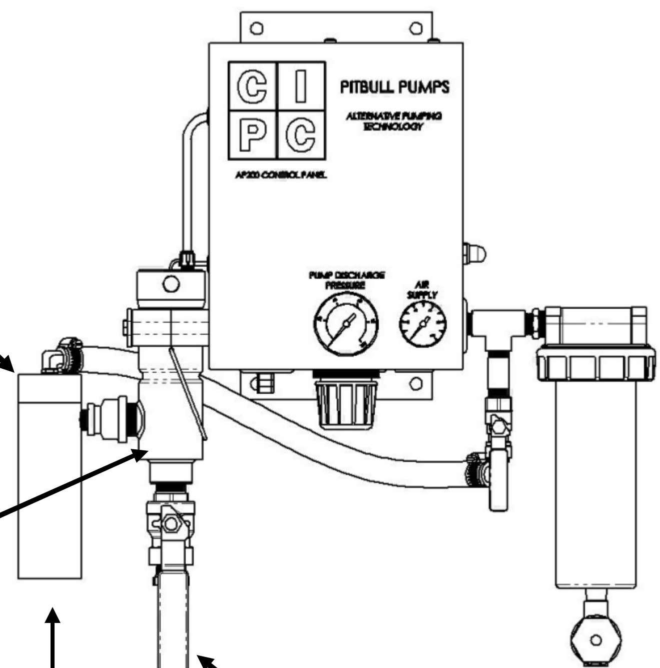
Generally, either the fluid is being restricted getting in, or the air is not easily being vented out.



FLOW INDUCEMENT TROUBLESHOOTING

If debris has built up in the Flow Inducer bore or jet, vacuum is lost, but noise and airflow remain. Unbolt top and inspect/clean-out. Test by checking the suction at exhaust valve barb.

If you see frost/ice build-up here, it may be throttling the vacuum flow. Try to run pump at a lower pressure. If not, see the factory for possible heater or oversized valve and hose.



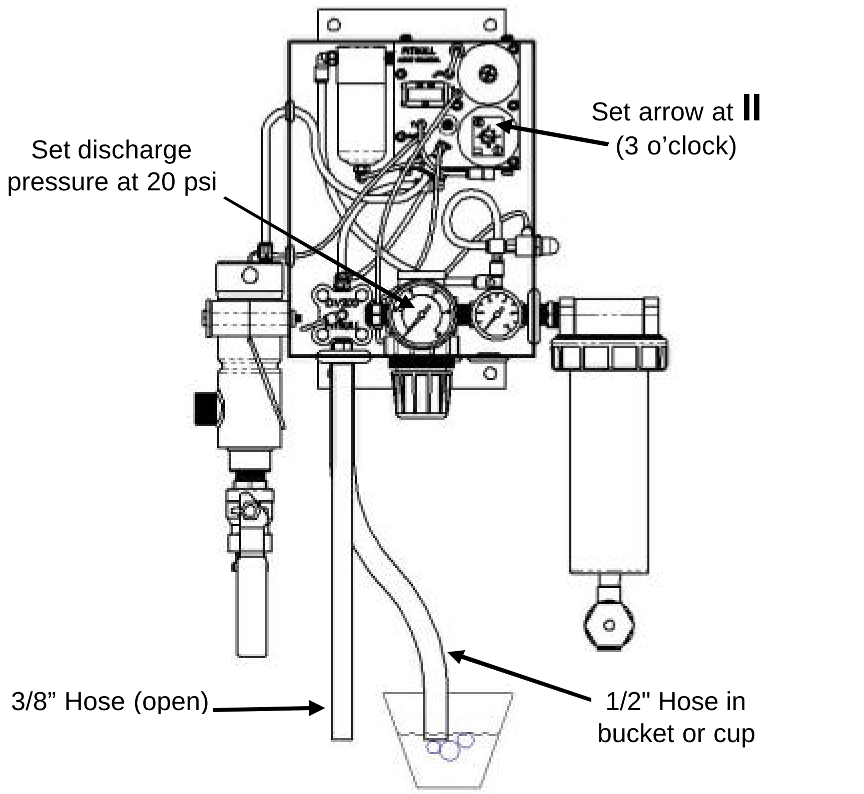
Positively, Absolutely, do not restrict this exhaust or the vacuum will be easily defeated. The path must be full diameter without backpressure.

Pull the hose off from this barb and feel if there is vacuum flow. If you have flow here, then the path down to the pump is probably plugged, or the inlet is blinded.

CONTROL PANEL PROBLEMS (**PLEASE READ!** Also, refer to component diagram on pages 15-16)

This test was developed to save your valuable time. There is no point in dissecting the panel if the problem lies elsewhere (most problems do!). **Therefore, we recommend this simple test of the panel's sensing and timing functions prior to any attempt to service internal components.**

THE 'BUBBLER TEST'



First, with the pump off-line and the air supply closed, remove the control airlines from the panel (the 3/8" and 1/2" ID hoses).

Find a 4' length of 1/2" ID hose and put this stub on the 1/2" panel barb. Find a 4' length of 3/8" ID hose and put this stub on the 3/8" barb. Open the air supply.

Now, with the 3/8" hose hanging open ended, take the 1/2" hose and dip the end in a bucket of water.

WARNING- HOSE WILL BLAST AIR WHEN PANEL FIRES OFF.

What you should observe is: a stream of bubbles from the end of the hose as you just touch it to the surface of the water. As the hose tip reaches approximately 1/2" of depth, the panel should go into the discharge mode, blasting air through both hoses. Pull the 1/2" line from the water, and wait for the discharge stroke to time out (glance at the *inside/small* gauge to confirm that at least 30 psi is remaining resident in the supply air during discharge so the timing function will work).

If the results are as described - good news! - The water was sensed, the panel discharged air from both lines and the timer reset the panel after its delay, the **control panel is OK**, and we can proceed to isolate and test other components. **If the panel did not perform as described, skip to the section on 'Panel Troubleshooting - Details', on page 17.**

*Given the control panel passed this simple diagnostic, review the following components for symptoms of their failure modes.

Airlines:

If the airlines are plugged or restricted the following respective symptoms will occur:

- **1/2" ID sensing/bubbler line-** will cause the pump to constantly cycle if plugged or restricted.
  Note: *in cases of hard water, or quick-drying materials, inspect the side port/elbow on the pump. The end can scale over and restrict this line.* Also check for crimps or splices of the airline
- **3/8" sensing line-** a plug in this line or its fittings will cause the pump to not cycle, staying in the fill mode after the pump is full.
- **3/4" or larger exhaust line-** a restriction in this line will slow the pump down by effectively throttling the exhaust. A plug (debris etc.) in this line will stop the pump altogether (stays in the fill mode). *Remember, a kinked or folded line will do the same things.*

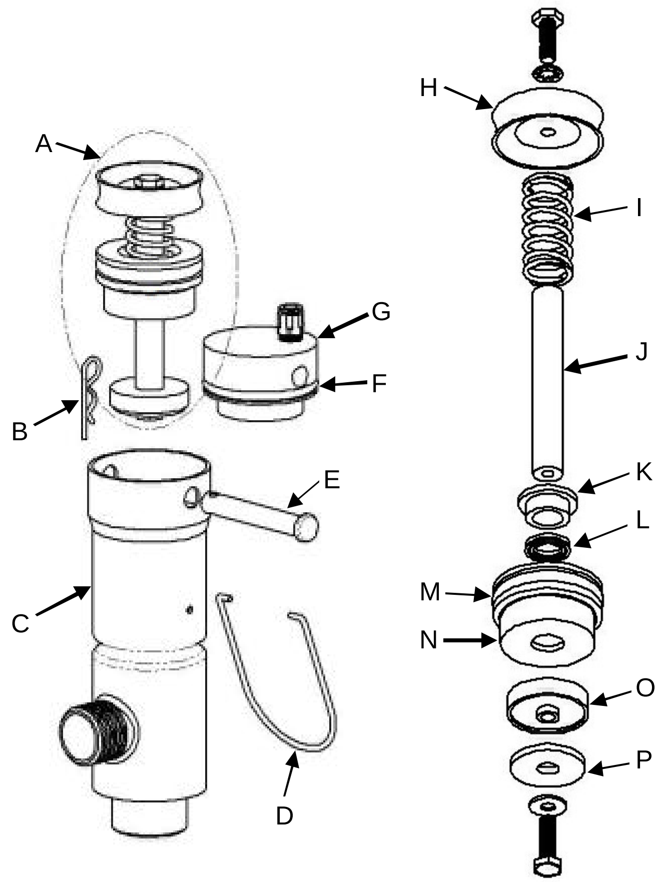
EXVS75 Exhaust valve:

Failed open- will cause a lack of pressure in the pump during discharge, because the discharge air is coming right back up through the exhaust valve. The discharge gauge will drop further than normal, and liquid may spray from the exhaust. Also, the fill cycle will be relatively short like in a deadheaded condition.

Response - Remove retaining ring and pin, and then pull the valve cap 'G' up and out. Pull the exhaust valve internals out (std. pliers on the top shaft bolt work well) and inspect. Look for **1)** debris inside valve, **2)** worn/missing poppet seat, **3)** worn piston seal and **4)** a cut/nicked o-ring on the valve cap.

Failed closed- will cause the pump to slow or stop cycling.

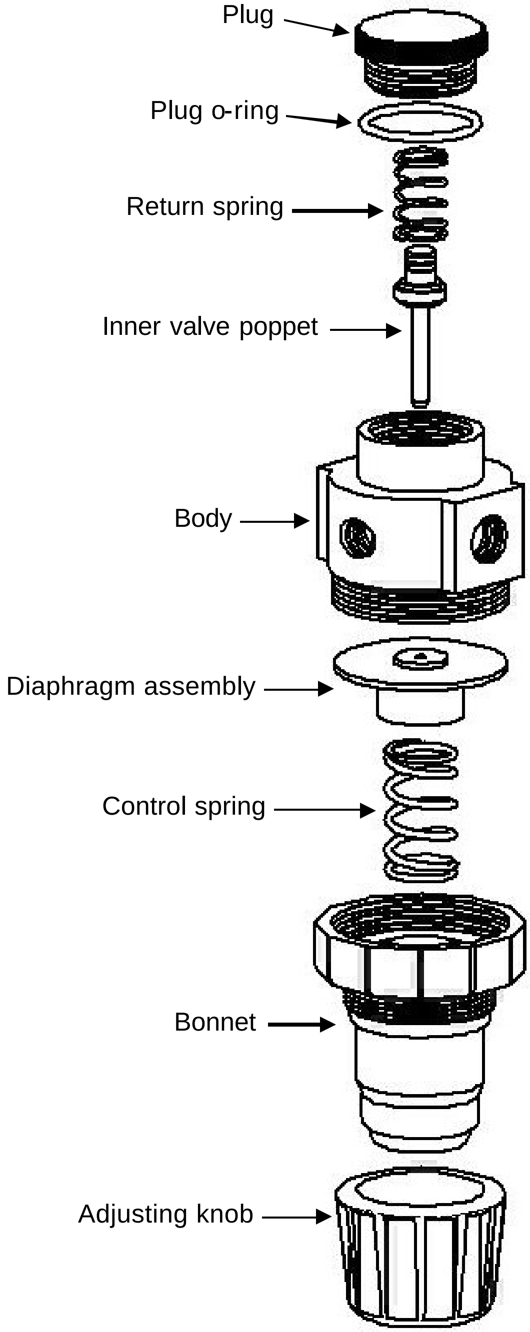
Response - Do the same disassembly/inspection of the exhaust valve as above.



A – Exhaust valve internals
B – Cotter pin
C – Exhaust valve body
D – Spring D-ring
E – Clevis pin
F – Valve cap o-ring
G – Valve cap

H – Piston cup seal
I – Return spring
J – Shaft
K – Guide bushing
L – Wiper shaft seal
M – Seal housing o-ring
N – Shaft seal housing
O – Poppet back
P – Poppet seat

PANEL TROUBLESHOOTING - COMPONENTS CONTINUED



<u>Discharge regulator:</u>

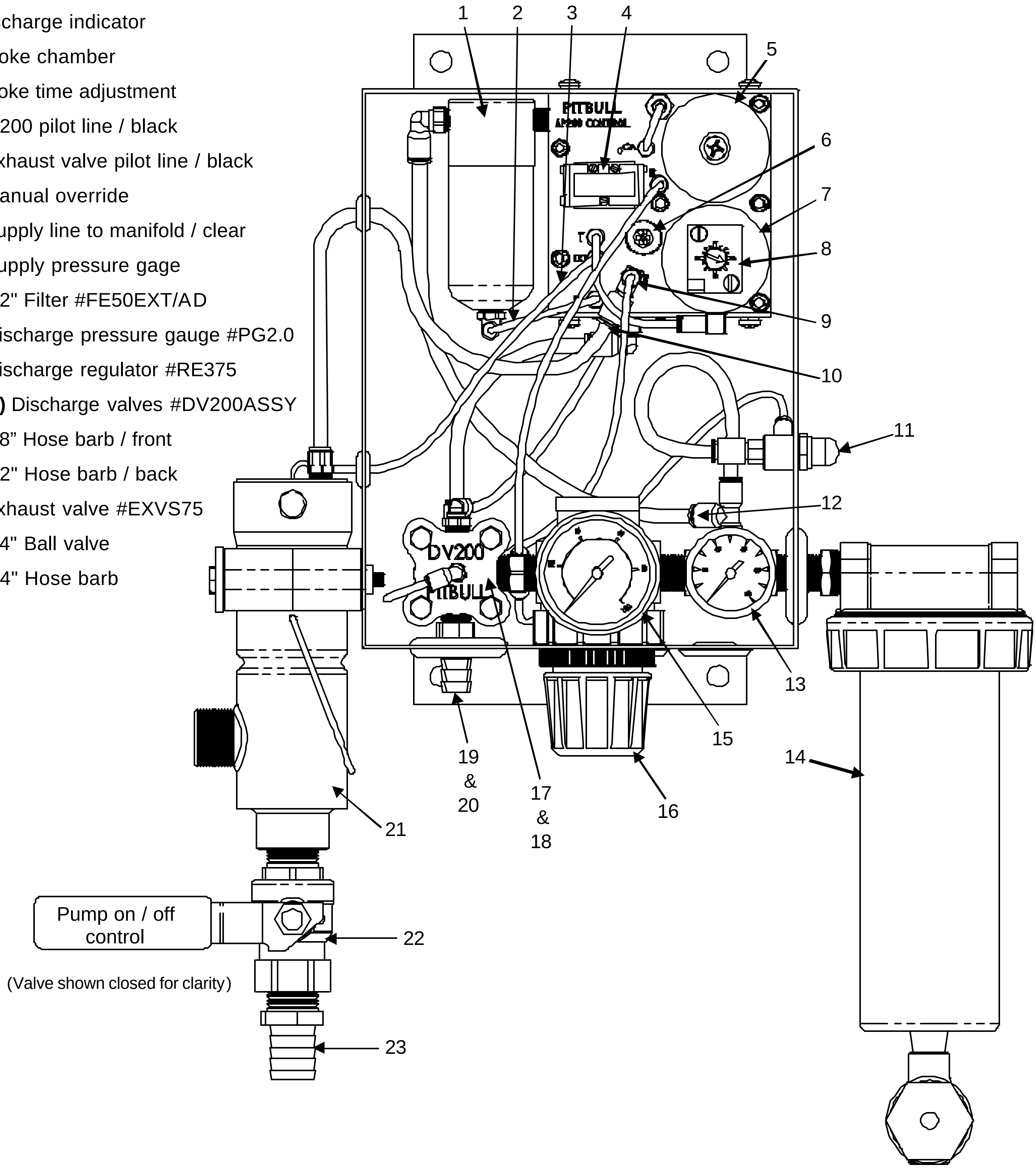
Trouble with the regulator usually shows up as an air leak in the regulator bonnet, and often a downstream pressure higher than the pressure setting. The most common regulator problem is debris in the poppet seat. This will be accompanied by the leaking (venting) bonnet, high downstream pressure and possible reduced air flow capacity from plugging.

Remedy by unscrewing bottom regulator nut and pulling the poppet/stem out. You can probably do this part with the regulator in place.

The other regulator failure mode is a ripped diaphragm. This will be accompanied by the same symptoms as above. You will have to remove the regulator from the panel and unscrew the bonnet to replace the diaphragm.

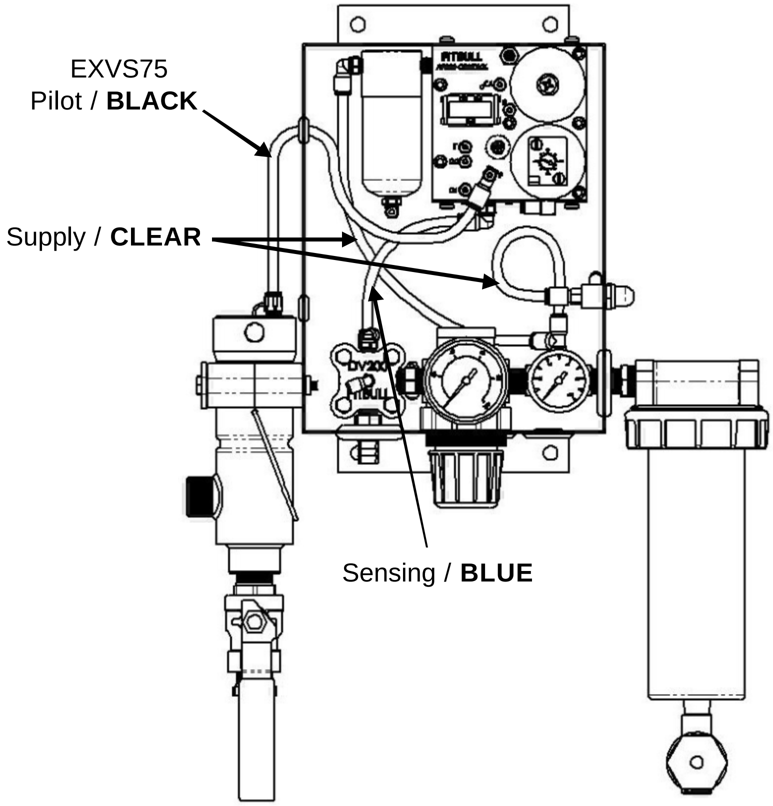
COMPONENT IDENTIFICATION - AP200 PANEL INTERNALS

1) Control filter #FC.1
2) Auto-drain line / yellow
3) Auto-drain line out / yellow
4) Logic relay
5) Supply chamber
6) Discharge indicator
7) Stroke chamber
8) Stroke time adjustment
9) DV200 pilot line / black
10) Exhaust valve pilot line / black
11) Manual override
12) Supply line to manifold / clear
13) Supply pressure gage
14) 1/2" Filter #FE50EXT/AD
15) Discharge pressure gauge #PG2.0
16) Discharge regulator #RE375
17,18) Discharge valves #DV200ASSY
19) 3/8" Hose barb / front
20) 1/2" Hose barb / back
21) Exhaust valve #EXVS75
22) 3/4" Ball valve
23) 3/4" Hose barb



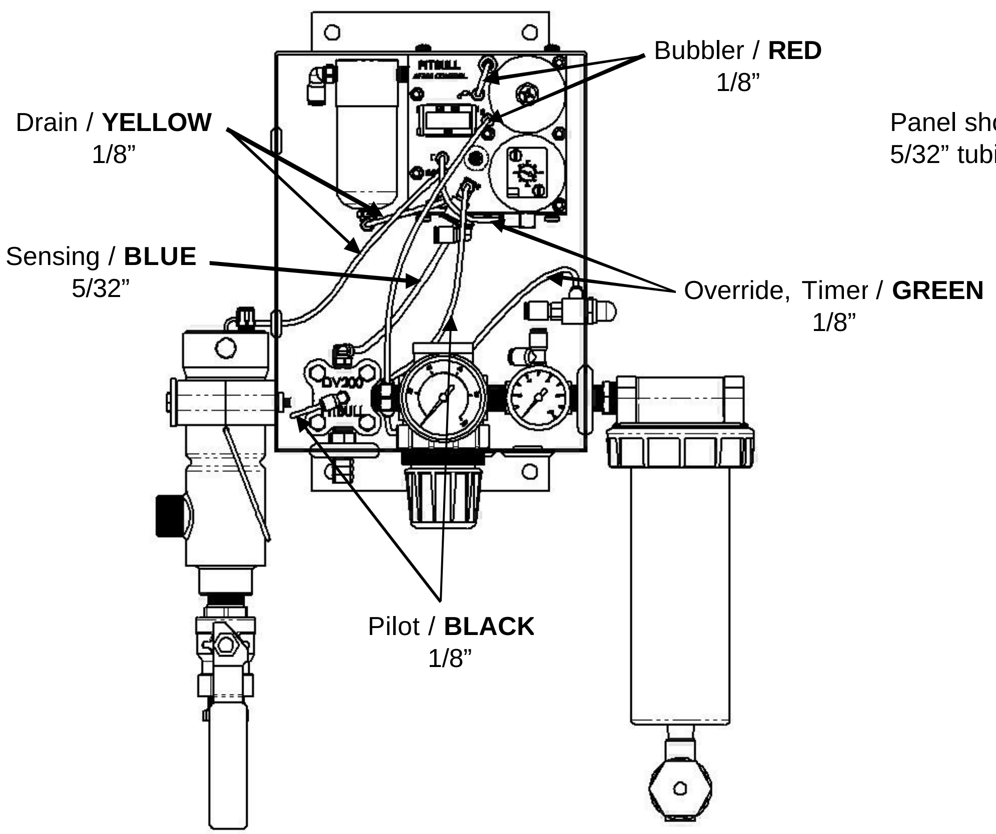
AP200 TUBING SCHEMATIC

View is of an open AP200 control panel.



Panel shown with **only** 1/4" tubing connected.

NOTE: To disconnect any of these tubing connections, just push in on the fitting collar and then pull the tube out. To reconnect, just push tube fully into the fitting

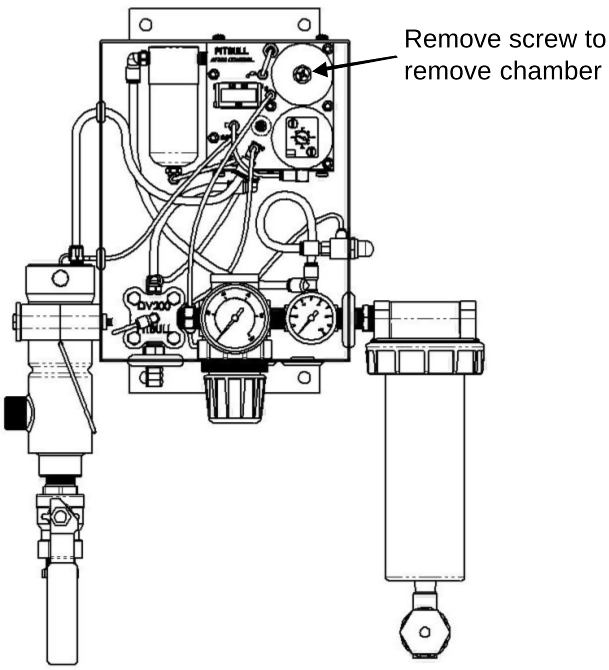


Panel shown with **only** 1/8” and 5/32” tubing connected.

PANEL TROUBLESHOOTING – DETAIL

This section is only for panels that failed the initial diagnostic using the two airlines. You do not need to evaluate or work on these components if the panel passed the test. Referring back to the bubbler test you performed to get to this section (page 12), proceed based upon what you observed.

TEST RESULT (1) - <u>No bubbles came out of the 1/2" airline:</u> This is usually caused by plugged orifices, which are used to restrict plant air pressure down to a slow 'bleed' flow. **<u>Be sure of the test result</u>** before going to the work of these next steps.



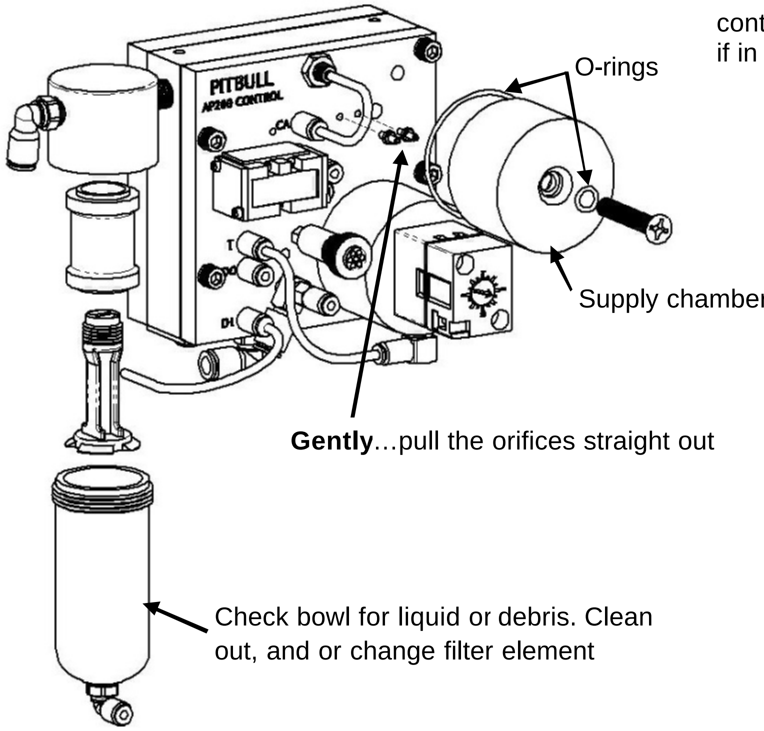
Remove the sealed supply chamber using a Phillips head screwdriver. (Hold on to the o-ring seals for re-assembly)

Using needle-nosed pliers, gently pull straight out on the orifices.

Hole each one up to the light. You should be able to see through them. If plugged, or bathed in oil (or anything else) try to clear them by blowing compressed air backwards through the orifice. They can almost always be cleared this way (if not contact the factory or your distributor for replacements).

Once cleared, just push the orifices back into their holes with your fingers. This is a friction fit (no glue!)

Also, check the condition of the control filter element that may have allowed the contaminants downstream, and replace if in question.



PANEL TROUBLESHOOTING - DETAIL CONTINUED

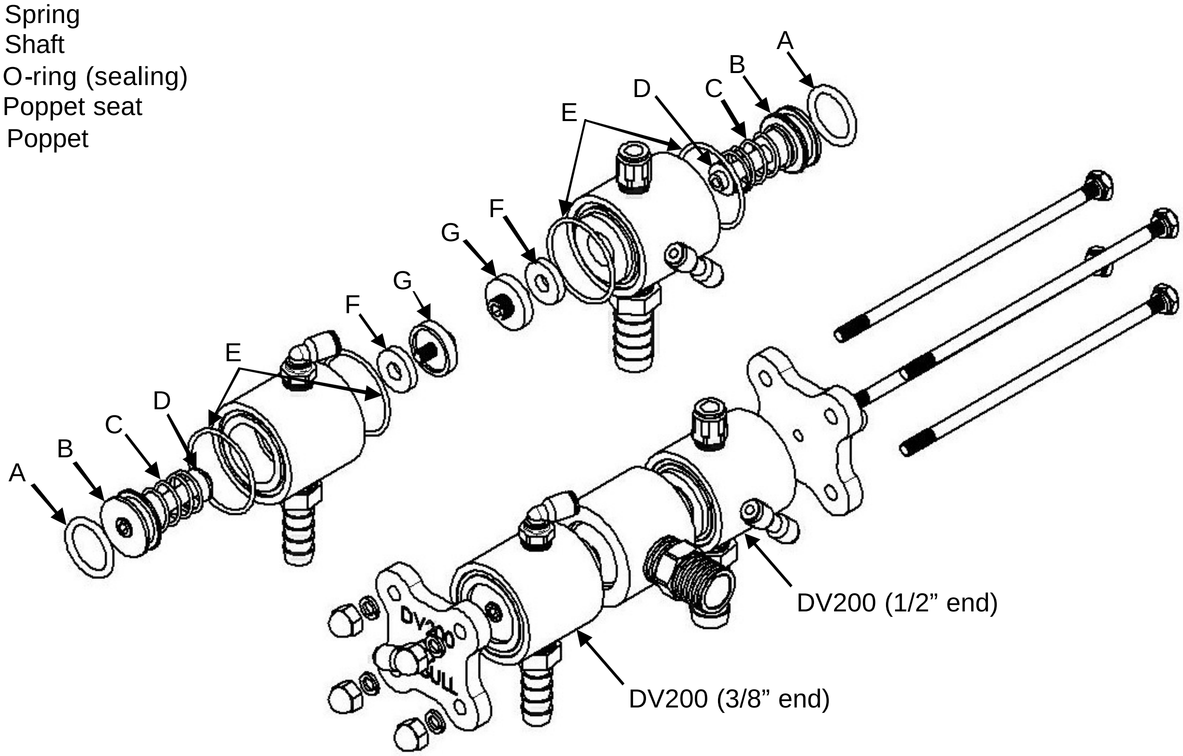
(Still proceeding based upon the results of the diagnostic bubbler test on page 12)

TEST RESULT (2) - <u>The 1/2" line bubbled, but the panel did not go into the discharge mode:</u>
First, try pushing the manual override and then proceed as follows;

If the panel went into the discharge mode by pushing the manual override, then wait for stroke to reset, and then place the end of the 3/8" line into the bucket of water (you used for the diagnostic test). Most likely you will see bubbles, and if so, the discharge valve (DV200ASSY) supplying the 3/8" line is leaking. Disassemble the discharge valve, inspecting for debris and/or a worn out seats/o-rings. Clean or replace as required.

DV200ASSY - PARTS

- **A** – O-ring (sliding seal)
- **B** – Piston
- **C** – Spring
- **D** – Shaft
- **E** – O-ring (sealing)
- **F** – Poppet seat
- **G** – Poppet



If the panel goes into the discharge mode by pushing the manual override but will not reset, or resets but immediately discharges again (remember the airlines are not connected to the pump at this point): First see if air is blowing strongly from both air lines. If not, disassemble both DV200ASSY discharge valves, inspecting the poppet seats, and the piston/o-ring operators. Replace all worn parts and re-lube the o-rings with silicone o-ring grease (see exploded diagram above).
If air blew strongly from both lines, then inspect all tubing and connections for leaks using soapy water or equivalent. Replace or tighten leaks as appropriate.

PITBULL® AP200 CONTROL PANEL AND SPARE PARTS

Part #	Description
AP200	Complete control panel less airlines *(Fig 15A)*
APLOGIC	Control logic mounted on manifold, filter, logic disk, timer & relay *(Fig 15B)*
DV200	Discharge valve (complete dual valve, assembled) *(Fig 15J)*
DV200K	Discharge valve seat, and seal rebuild kit
DV200ASSY	Discharge valve assembly (Includes discharge valve, regulator, supply and discharge pressure gauges) *(Fig 15I)*
EXVS75	Complete 3/4" SS exhaust valve, viton seat, nitrile piston *(Fig 15H)*
EXVS75S	3/4" SS exhaust valve seat, and seal rebuild kit
EXVS75INT	Complete drop in replacement internal assembly
FBC.1	Polycarbonate filter bowl *(Fig 15G)*
FEC.1	Control filter element *(Fig 15F)*
FC.1	Control filter complete w/ bowl, housing and element *(Fig 15E)*
OR-10K	Orifice kit, includes 4 orifices *(Fig 15D)*
PBASI	Status indicator with nipple *(Fig 15C)*
PG2.0	Liquid filled 1-100 psi discharge gauge *(Fig 15L)*
PG1.5	Supply pressure Gauge *(Fig 15N)*
RE375	Discharge regulator 3/8" NPT *(Fig 15K)*
RE375K	Discharge regulator rebuild kit 3/8" NPT
EXVHTR	Heaters with temperature control, for all exhaust *valves*. *(Fig 15M)* (Recommended when panel is mounted in a location prone to freezing)

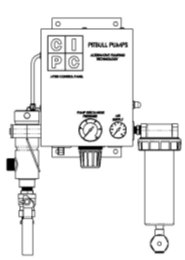


Fig 15A

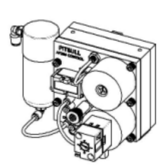


Fig 15B


Fig 15C


Fig 15D

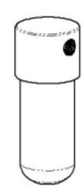


Fig 15E


Fig 15F

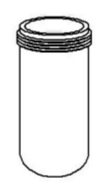


Fig 15G


Fig 15H

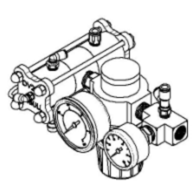


Fig 15I

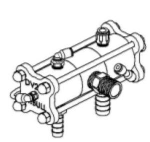


Fig 15J


Fig 15K

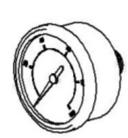


Fig 15L

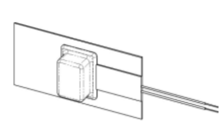


Fig 15M


Fig 15N

PITBULL® AP200 CONTROL PANEL OPTIONS

Flow Inducers Submersible & Transfer Pumps

F2K	Flow inducer with on/off ball valve (2” submersible & transfer pumps) *(Fig 13A)*
F3K	Flow inducer with on/off ball valve (3” submersible & transfer pumps) *(Fig 13A)*
F4K	Flow inducer with on/off ball valve (4” submersible & transfer pumps) *(Fig 13B)*

Mufflers

ST-6B	Muffler (3/8”) (F2 & F3 flow inducer) *(Fig 13C)*
ST-12C	Muffler (3/4”) (F4 flow inducer) *(Fig 13C)*

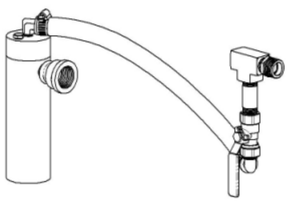


Fig 13A

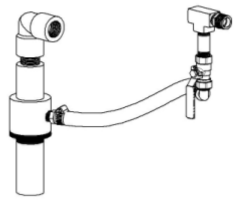


Fig 13B

Fig 13C

AIR SUPPLY FILTER (same as supplied on original equipment)

F50/AD	1/2" filter with autodrain
FE50	40 micron filter element for F50 filter

AIR SUPPLY REGULATORS (recommended when supply pressure >110 psi to avoid excess pressure in the logic circuit)

RE50	1/2" pressure regulator, 0-150 psi
RE50K	Repair kit for RE50 regulator

CIPC CHECK VALVES

CIPC recommends that customer's stock inlet and discharge check valve internals, and in cases of expected high wear such as abrasive slurries we recommend entire spare check valves. Following is a list of **CIPC** check valve part numbers and descriptions.

Part #	Size	Description
2CVP/C(_)	**2"**	**CIPC steel swing check, plate style, full port, complete assembly for S2C pumps.** *(Fig 20A)*
2CVP/S(_)	**2"**	**CIPC 316SS swing check, plate style, full port, complete assembly for S2S pumps.** *(Fig 20A)*
2CVF/(_)	**2"**	**Flapper (316SS)** *(Fig 20B, 20D exploded)*

Seat adders for check valve flappers

** Pumps are built with NITRILE seats as standard **

(N)	Nitrile seat for 2" check
(V)	Viton seat for 2" check.
(T)	Teflon seat for 2" check.
(UHD)	Heavy duty urethane seat for 2" check
(E)	EPDM seat for 2" check.

2CVSK(_)	**2"**	**Seat kit (2 seats), for 2" checks**

(N)	Nitrile seat for 2" check
(V)	Viton seat for 2" check
(T)	Teflon seat for 2" check
(UHD)	Heavy duty urethane seat for 2" check
(E)	EPDM seat for 2" check

2CVGK	**2"**	**Flange gasket kit (4 gaskets) for 2" check valve** *(Fig 20C)*

** *(3) gaskets required for submersible (1 spare) & (4) required for transfer pumps*

** **CIPC** *strongly recommends that new gaskets be installed whenever reassembling check valves*.

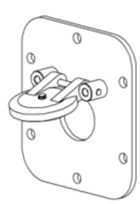


Fig 20A


Fig 20B

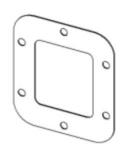


Fig20C

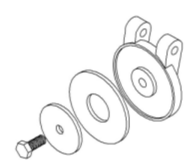


Fig20D

Seat Material Selection Properties:

Nitrile — Good all-purpose elastomer. Medium chemical, oil and solvent resistance, good strength, temperatures up to 170°F.

Viton — Excellent resistance to oxidizers and solvents. Medium strength, temperatures up to 250°F.

Teflon — Best chemical resistance of all. Inert to acid bases and solvents. Lower cycle life, non-elastomeric, temperatures up to 300°F.

Urethane HD — Best resistance to abrasion. Toughest of the elastomers, with mild chemical resistance, temperatures up to 150°F.

EPDM — Good heat and acid/base resistance. Tougher than Viton but poor solvent resistance, temperatures up to 300°F.

CIPC CHECK VALVES CONTINUED

3CVP/C(_)	**3"**	**CIPC steel swing check, plate style, full port, complete assembly for S3C pumps.** *(Fig 20A)*
3CVP/S(_)	**3"**	**CIPC 316SS swing check, plate style, full port, complete assembly for S3S pumps.** *(Fig 20A)*
3CVF/(_)	**3"**	**Flapper (316SS)** *(Fig 20B, 20D exploded)*

Seat adders for check valve flappers

** Pumps are built with NITRILE seats as standard **

(N)	Nitrile seat for 3" check
(V)	Viton seat for 3" check
(T)	Teflon seat for 3" check
(UHD)	Heavy duty urethane seat for 3" check
(E)	EPDM seat for 3" check

3CVSK(_)	**3"**	**Seat kit (2 seats), for 3" checks**

(N)	Nitrile seat for 3" check
(V)	Viton seat for 3" check
(T)	Teflon seat for 3" check
(UHD)	Heavy duty urethane seat for 3" check
(E)	EPDM seat for 3" check

3CVGK	**3"**	**Flange gasket kit (4 gaskets) for 3" check valve** *(Fig 20C)*

** *(3) gaskets required for submersible (1 spare) & (4) required for transfer pumps*

** **CIPC** *strongly recommends that new gaskets be installed whenever reassembling check valves*.

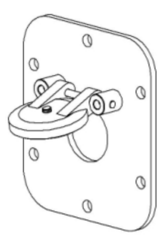


Fig 20A


Fig 20B

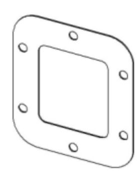


Fig20C

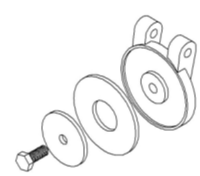


Fig20D

Seat Material Selection Properties:

Nitrile — Good all-purpose elastomer. Medium chemical, oil and solvent resistance, good strength, temperatures up to 170°F.

Viton — Excellent resistance to oxidizers and solvents. Medium strength, temperatures up to 250°F.

Teflon — Best chemical resistance of all. Inert to acid bases and solvents. Lower cycle life, non-elastomeric, temperatures up to 300°F.

Urethane HD — Best resistance to abrasion. Toughest of the elastomers, with mild chemical resistance, temperatures up to 150°F.

EPDM — Good heat and acid/base resistance. Tougher than Viton but poor solvent resistance, temperatures up to 300°F.

CIPC CHECK VALVES CONTINUED

4CVP/C(_)	**4"**	**CIPC steel swing check, plate style,** **full port, complete assembly for S4C pumps.** *(Fig 20A)*
4CVP/S(_)	**4"**	**CIPC 316SS swing check, plate style,** **full port, complete assembly for S4S pumps.** *(Fig 20A)*
4CVF/(_)	**4"**	**Flapper (316SS)** *(Fig 20B, 20D exploded)*

Seat adders for check valve flappers

** Pumps are built with NITRILE seats as standard **

(N)	Nitrile seat for 4" check
(V)	Viton seat for 4" check.
(T)	Teflon seat for 4" check.
(UHD)	Heavy duty urethane seat for 4" check.
(E)	EPDM seat for 4" check.

4CVSK(_)	**4"**	**Seat kit (2 seats), for 4” checks**

(N)	Nitrile seat for 4" check
(V)	Viton seat for 4" check.
(T)	Teflon seat for 4" check.
(UHD)	Heavy duty urethane seat for 4” check.
(E)	EPDM seat for 4" check

4CVGK	**4"**	**Flange gasket kit (4 gaskets) for 4” check valve** *(Fig 20C)*

** *(3) gaskets required for submersible (1 spare) & (4) required for transfer pumps*

** **CIPC** *strongly recommends that new gaskets be installed whenever reassembling check valves*.

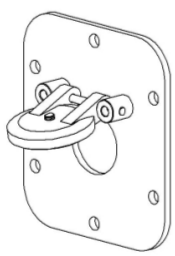


Fig 20A


Fig 20B

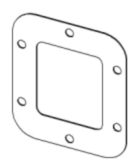


Fig20C

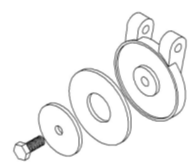


Fig20D

Seat Material Selection Properties:

Nitrile Good all-purpose elastomer. Medium chemical, oil and solvent resistance, good strength, temperatures up to 170°F.

Viton Excellent resistance to oxidizers and solvents. Medium strength, temperatures up to 250°F.

Teflon Best chemical resistance of all. Inert to acid bases and solvents. Lower cycle life, non-elastomeric, temperatures up to 300°F.

Urethane HD Best resistance to abrasion. Toughest of the elastomers, with mild chemical resistance, temperatures up to 150°F.

EPDM Good heat and acid/base resistance. Tougher than Viton but poor solvent resistance, temperatures up to 300°F.

ALL RUBBER FLAPPER CHECK VALVES

For 2”, 3”, and 4” pumps

These all rubber hinged designed check valve flappers are used in place of our standard plate style flapper. Designed to be used on stringy or irregular shaped products they may build up around our standard check valve flapper. Designed only for specific qualifying applications.

Contact **CIPC** with your specific pumping application.

INLET TRANSFER ADAPTERS

2CTAD	2” carbon steel adapter *(Fig 14A & 14B)*
2SSTA	2” 316SS adapter *(Fig 14A & 14B)*
3CTAD	3” carbon steel adapter *(Fig 14A & 14B)*
3SSTA	3” 316SS adapter *(Fig 14A & 14B)*
4CTAD	4” carbon steel adapter *(Fig 14A & 14B)*
4SSTA	4” 316SS adapter *(Fig 14A & 14B)*

Adder for threaded inlet adapter plate (same adapter as on inlet of transfer pumps).
Includes: plate with male threaded end, valve plate gasket, extra length bolts for check valve flapper posts(sealing bolts). Pump is capable of dry-piping inlet with this adapter. Note size and construction of pump.

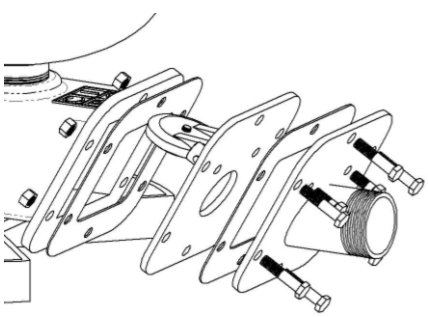


Fig 14A

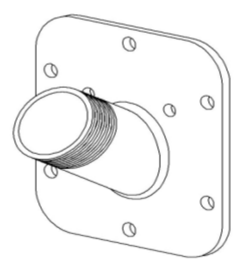


Fig 14B

NON-METALLIC CHECK VALVES FOR VINYLESTER PUMPS

Contact **CIPC** with your pump serial number for current available products for your pump.