Operation and Maintenance Manual For All Variations of: SP310G2–G6, SP310F2–F6

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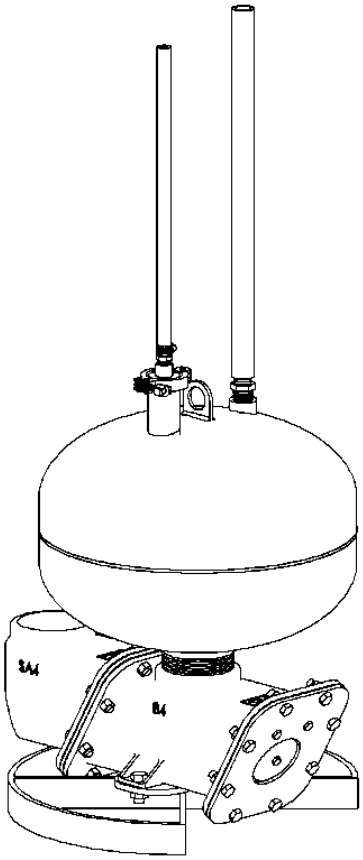
SYSTEM OVERVIEW

Each **PITBULL**® pumping system is comprised of a pump with two check valves, a control panel, and the main connecting airline with probe/line.



Pump with check valves, probe and main airline

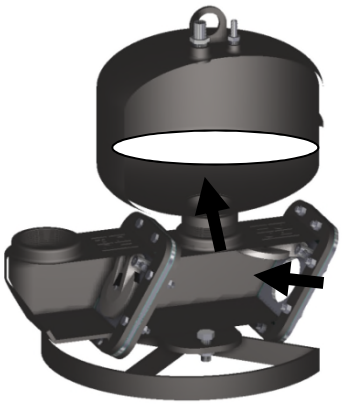
SP310F3-LLC (typical) control panel with CPH50-6 probe and jacketing line.

THE PITBULL® PUMPING PRINCIPLE

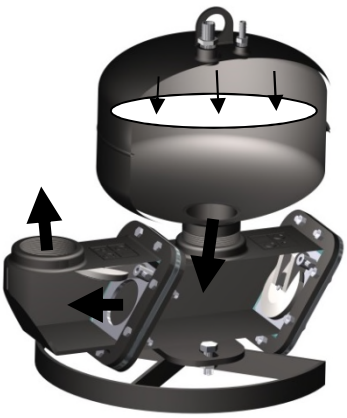
The **PITBULL**® pumps liquid by allowing liquid to fill the pump through the inlet check valve, and then when full, it pressurizes with compressed air and forces the liquid out through the discharge check valve. The check valves act to direct the liquid in the correct direction.

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. In the **PITBULL**® flow-induced configuration the pump will pull liquid into it, and can be located submersed in or above the liquid.

Pump filling through inlet check valve.



Pump pressurized, forcing liquid out discharge.



PANEL INSTALLATION

The SP310 control panels are shipped loose for remote mounting. Fifteen feet of airline and probe line are included as standard. *To finish installing the control panel, please follow the steps outlined below.*

1- <u>Mount the panel above the liquid level</u> (that feeds the pump**) whenever possible.**

2- Bring your compressed air supply to the inlet (A) on the side of the panel (see figure).

Please follow the table for the recommended air piping size for your pump model to insure full and correct functioning of your system. Be aware that the **PITBULL**® uses compressed air in spurts, and needs a larger diameter airline than the average air consumption would require.

<u>Pump# - Inlet</u>		<u>Air Supply</u>
T or S2C/S	2"	3/4" pipe
T or S3C/S	3"	3/4" pipe
T or S4C/S	4"	3/4" pipe
Custom 6" and larger		1-1/2" pipe

Filtration; please attach filter and autodrain (provided) at this location. <u>Do Not Lubricate!</u>

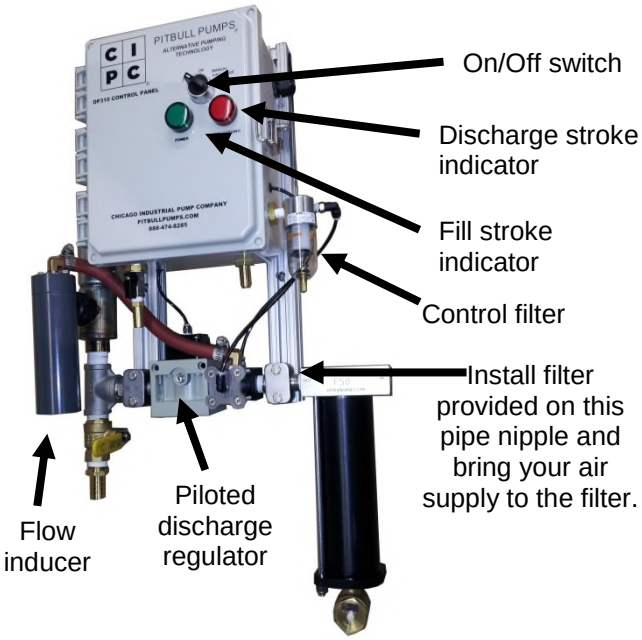
3- Provide the panel with a 110VAC power source. The hole for the power cord strain relief will fit 1/2" conduit if the standard cord is not acceptable.

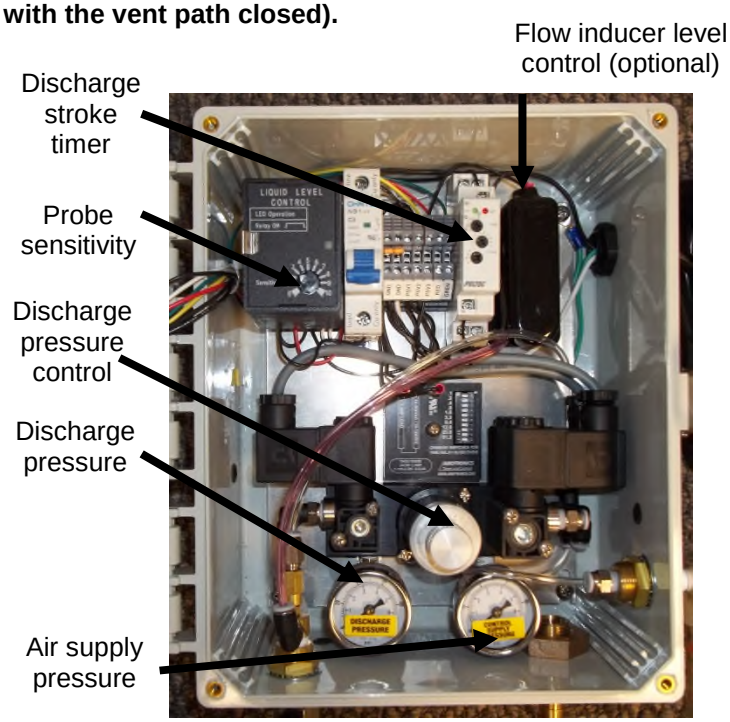
4- (optional) On dry piped applications it is often desirable to run an exhaust line from the open exhaust port back up to the top of the feed tank, or to a suitable drain. This will prevent spillage in the event of compressed air or power failure (see "Recommended Installation" sketches) and will reduce exhaust noise. Note that this line will require a drain valve/port because of condensation that will collect.

Mufflers: you may choose to install a muffler, especially in high-pressure applications. <u>However, avoid porous media mufflers that will plug up and throttle/stop the pump</u>. **CIPC** also sells straight through (no restriction) mufflers as an option for vacuum generators.

<u>IMPORTANT</u>

<u>DO NOT install a solenoid valve on the air supply</u> as the on/off control for the PITBULL®.
<u>DO NOT</u> use the air supply as the on/off control for the PITBULL®.
<u>DO NOT</u> use the power supply as the on/off control for the PITBULL®.
<u>DO use the supply of liquid (the PITBULL® will not cycle without liquid)</u> or the exhaust path as your on/off control (the pump can't fill/cycle with the vent path closed).





INSTALLATION OF THE PUMP

INSTALLING THE PUMP (SUBMERSED)

The pump should be placed on the bottom of the sump, as near level as reasonable and avoid tilting more than 10 degrees.

Try to keep approximately 1X the pump's piping diameter of open space in front of the inlet to allow full liquid and solids flow into the port (example: 3" submersible should have 3" or more of open space in front of the inlet port).

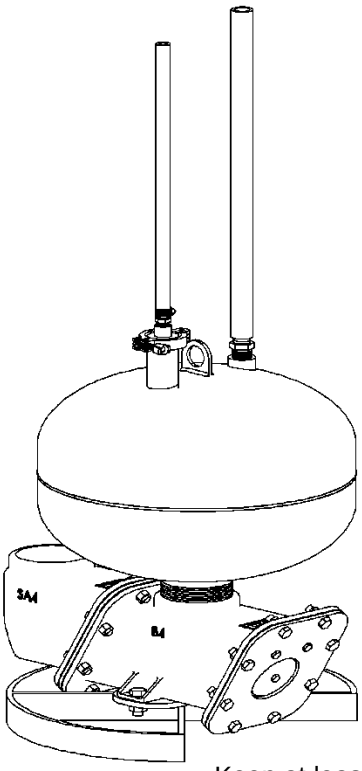
Discharge Piping:

Try to match the discharge piping to the size of the outlet port. Avoid reducing more than one pipe size unless imperative. The reasons and trade-offs are as follows,

1- for an average flow rate of 50 gpm, the **PITBULL**® will be discharging liquid at 100+ gpm in discreet bursts so friction losses need to be based on the burst flow, not the averaged flow over time. Our pipe sizes are oversized for the average flow but appropriate for the flow during the discharge stroke.

2- The **PITBULL**® will pass large solids. Watch out for pumping bigger stuff than your piping (and particularly valves) can take.

****Note:** If you are reducing the piping and have potential for large solids, consider adding a strainer to the pump inlet. **CIPC** offers intake screens for submersed pumps or with a threaded adapter you can improvise your own.



Keep at least one pipe diameter open in front of the inlet

Installing Probe

1) Place gasket in groove on pump ferrule

Shown with gasket in place

2) Insert probe though gasket and ferrule into pump

3) Align probe top cap on ferrule, place clamp around ferrule and cap, and hand tighten clamp

PUMP INSTALLATION IN 'DRY-PIPED OR TRANSFER MODE

The 'T' series pumps with SP310 panels have adapters on the inlet to allow for piping connections. These pumps operate identically to the submersible pumps and are often virtually identical in construction and parts. However there are a few critical concerns when applying the **PITBULL**® pump with SP310 controllers in this type of service.

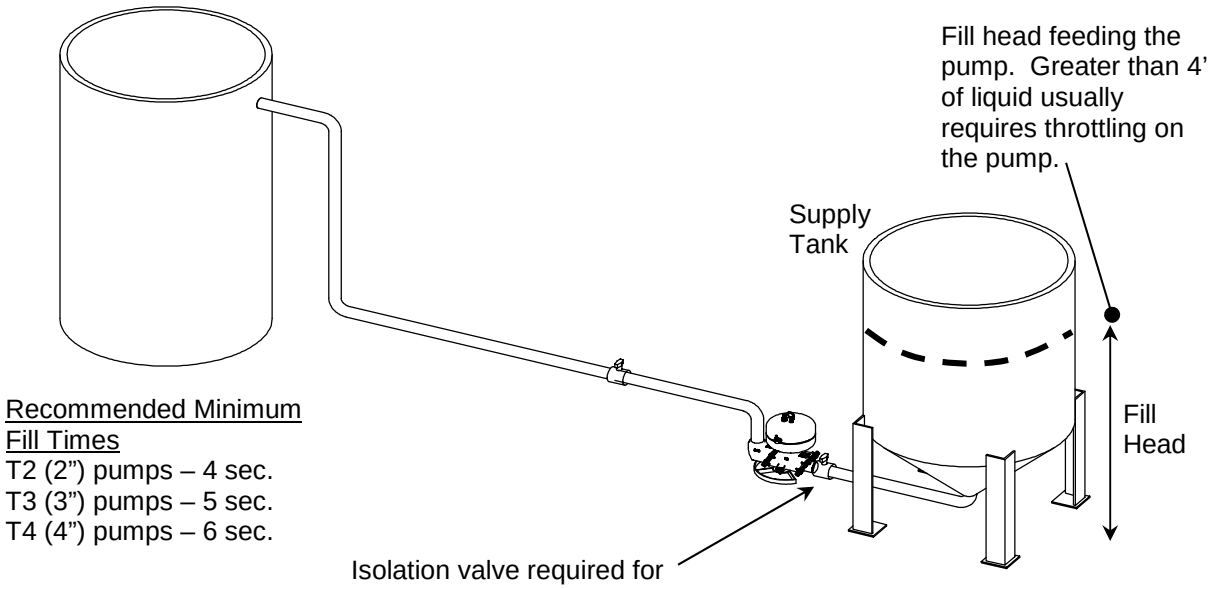
Install- follow the same procedures for air supply, panel mounting, airline connections as the submersible. If possible, try to mount control panel above the maximum liquid level in the supply tank. If not possible pay particular attention to the 'Shut-down Procedure' following.

Make sure you have an isolation valve ahead of the pump!! (don't skip this) If the pump is shut off without being isolated, liquid will flow into it and up the exhaust path!! We provide an isolation valve on that main airline pathway, and offer automated options, but closing the liquid supply is the very best.

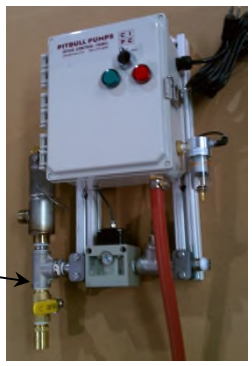
Fill Head (must read)- This is the positive head feeding the pump. When greater than 5 feet, the pump can fill faster than it's designed for and liquid can spray from the exhaust because of turbulence in the pump. If the 'fill' portion of the pump stroke falls under the recommended time, increase the filling time by partially closing the isolation valve on the inlet, or partially closing the ball valve (provided) just below the exhaust valve (see photo).

Shut-down Procedure (must read also)- Do not cut either the air or power 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.



If installing a flow induced- level control option on a transfer pump, see the next page on self-priming to learn about inserting the level control line down in from the top of your supply tank.

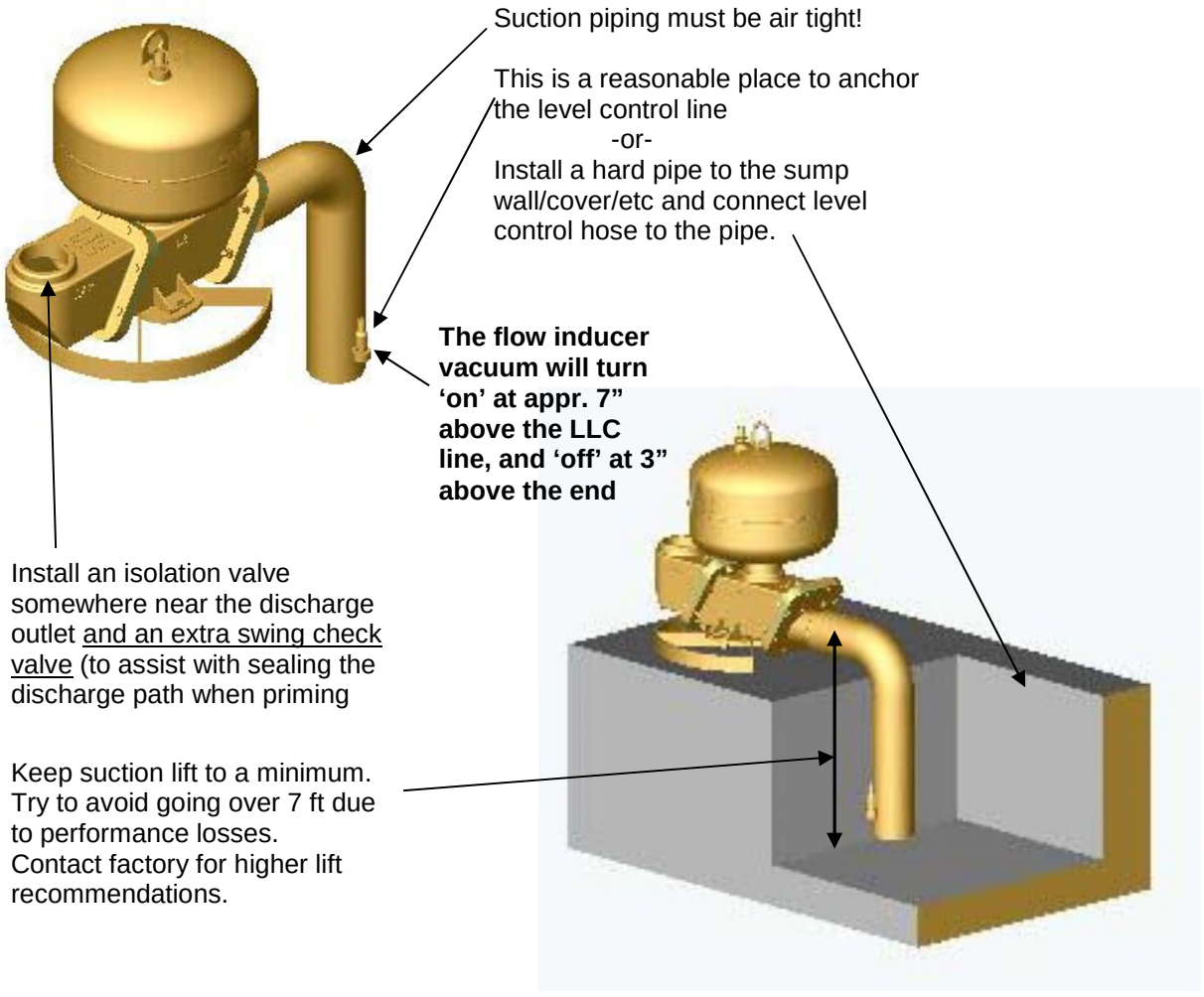


This ball valve can be used to throttle (increase fill time) and to block out the panel from the pump.
*The best isolation is your valve on the inlet supply

PUMP INSTALLATION USING SELF-PRIMING CONFIGURATION

All the previous information applies to self-priming installation since there is no difference in how the pump functions. The important installation and set-up difference to account for are;

1) The level control line does not anchor to the pump because the pump is not in the sump. Instead, the level control line must end in the sump at the liquid level you wish the pump to hold. *TIP- ¾" <u>or larger pipe</u> is often used as the submersed end of the level control line and then the level control hose supplied with your system is connected to the top of the pipe with the other end in the sump at the desired level. If the pipe is clamped, it can be adjusted up or down to change the sump level*.
2) The suction/down-pipe and its connections must be air-tight. NO LEAKS.
3) On the discharge piping there needs to be an isolation valve. The <u>important reason</u> for this is when the piping system is dry, the pump can pull air in through the discharge if <u>any</u> debris is under the discharge check seat. This will waste the vacuum being created and the suction lift is lost. Close the valve until the pump cycles into the discharge mode; once liquid is in the piping the check valve will seal well enough to prime.
4) The 'fill' time will be longer depending on the suction lift. The higher the lift required, the longer it will take to fill the pump.



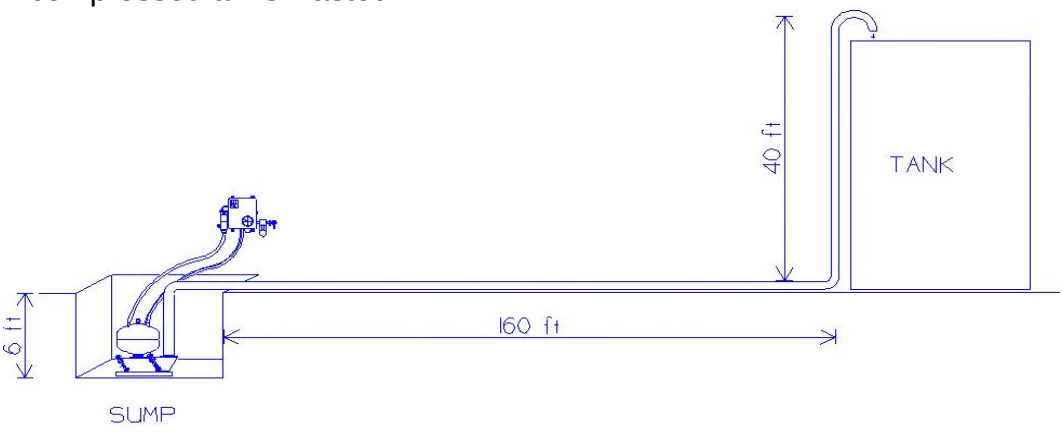
START-UP AND SETTINGS

KEY CONCEPTS. The control panel doesn't intentionally control the fill strokes; the time needed to fill the pump chamber is based upon how quickly fluid flows into the pump. However long that time is before the internal 'full' level is sensed, that will be the duration of the fill stroke (ranging from very few seconds to 'infinite'-no flow condition).

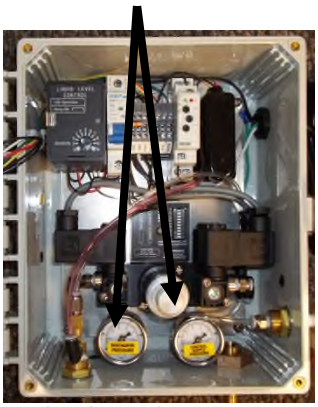
The discharge stroke is controlled by time. Under the majority of circumstances it takes a fixed amount of time to discharge the pump contents at a given head pressure. The panel comes factory preset for typical pumping conditions and generally with not need adjustment unless there is a significant reduction in the discharge line size, or a long pipe run, or for thick/viscous fluids.

The discharge pressure **is factory preset for 40 psi** using the discharge pressure adjustment (*see photo below on right*). When initially starting up the pump, do not change the discharge time or probe sensitivity and only adjust the discharge pressure if needed. Please see the section on adjusting settings if you have (1) a very long pipe run, >300' or (2) a reduction of two more pipe sizes in the discharge piping. In those cases you will need to increase the discharge pressure and/or the stroke time.

Setting the discharge pressure. Try to determine the total dynamic head required for the application. In simple terms, take the vertical height that 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: too little discharge pressure will cause little (or none) fluid to exit the pump (the pump is essentially deadheaded). Too much pressure and compressed air is wasted.



Set discharge pressure with this knob and gauge



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 *to put out a 20 gpm flow rate the pump must take in 40 gpm while no fluid is discharging, and then discharge at 40 gpm while no fluid is filling to pump in order to average the 20 gpm.* So, use 40 gpm to calculate friction losses.

TIP: If your discharge piping size is the same as the **PITBULL**®, the velocity will be low enough 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 psi is close enough. (Note that the friction loss was small)

START-UP SETTINGS CONTINUED

<u>Setting the discharge time</u> ***(pumps are factory pre-set and typically will not require adjustment).***

Reasons to determine if stroke adjustment is required.

1) By observing the outfall of the discharge piping you can tell the stroke volume coming out is not anywhere close to the pumps' size/volume.
2) The discharge line is long (150 ft+) or the discharge line is more than one size smaller than the discharge of the pump.
3) The fluid is viscous.
4) The pump is refilling faster than it should (ie: because it didn't empty during discharge so refilling the pump takes very little time).

Any of the above reasons is only valid if you already know you are using enough discharge pressure to push the fluid from 'A' to 'B' and you have ruled out closed/partially closed valves etc.

Discharge Timer Close-up

<u>TIMER SETTINGS</u>

RANGE (top dial) is set to 0-10 sec range.

TIME is preset and can be adjusted. Typical settings are listed in table. (Navy T4 retrofit 4.5 sec)

FUNC is the function type. This should be set to 'e'

Do not change the 'Range' setting. It is set to the 0-10 sec scale, which is corrected for 99.9% of the pumps.

<u>The middle pot is the actual adjustment you will make.</u> Each number X 10 sec is the discharge time; .3 x 10 = 3 seconds.

Leave bottom pot on 'e' function (see below for emergency mode operation). Look closely to make sure this does not get unintentionally changed

<u>EMERGENCY BYPASS MODE</u>

By switching the FUNC dial to 'd', the panel will continuously cycle the pump at the frequency set on the TIME dial, regardless of probe and level inputs. Use this mode as a temporary back-up if probe issues cannot be immediately resolved. Pump may over-fill, under-fill and or push air downstream under this mode of operation.

TROUBLESHOOTING

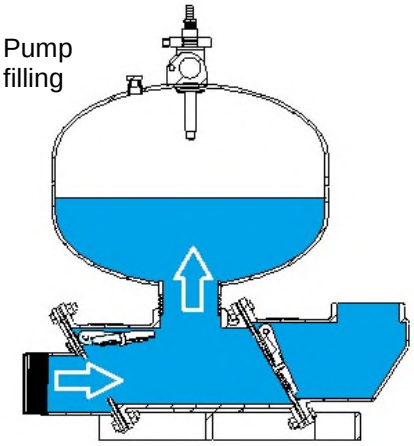
OVERVIEW OF OPERATION (simple version)

The **PITBULL®** pump using a SP310 series control panel is designed to sense the pump chamber being full of liquid and then pump that chamber volume of liquid out for a pre-set amount of time. The amount of time to discharge a chamber full of liquid is consistent in a majority of installations but the panel allows for the user to modify this stroke for special conditions.

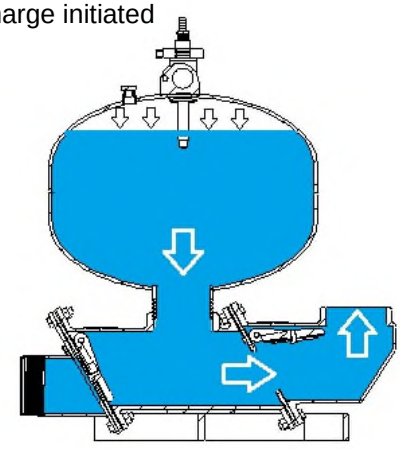
In sequence, starting with an empty pump chamber;

1- The pump chamber begins filling.
2- The liquid level inside the chamber reaches the probe tip.
3- The control panel energizes the piloting solenoid valves and pressurizes the pump.
4- Once the liquid level falls below the probe tip, the timing of the discharge stroke begins.
5- After the duration of the discharge stroke time, the unit resets to the filling mode to repeat the process.

Pump filling



Pump full and discharge initiated



WHAT CAN GO WRONG AND WHAT DOES THAT LOOK LIKE

<u>The pump fills and goes into a discharge mode and stays there.</u>
What to observe: the discharge light stays on constantly and the panel continues to send compressed air to the pump.
Likely cause(s): simplest one should be eliminated first.
1- The pump is deadheaded, It's plugged and fluid has nowhere to go so that the probe tip is still immersed in liquid and the timing sequence does not get a chance to start. The simplest way to determine this condition is to look for flow either in the liquid or the air supply. **2-** The discharge pressure is too low for the head. **3-** The probe is giving a false 'full' signal. Pull probe and check for excessive build-up. If all ok, then try a lower probe sensitivity setting (see next page for instructions).

<u>The pump goes right back into discharge mode very quickly.</u>
What to observe; the fill light is on for a short time, less than 2 seconds.
Likely cause(s); 1- The pump is nearly deadheaded and little fluid leaves the pump during discharge. This could be from a lack of discharge pressure to plugged piping. **2-** The discharge check valve is held open and liquid is rushing back in while pump is filling.

<u>The pump takes too long to fill.</u>
What to observe; the liquid level is high enough to fill the pump (above the top) or if flow induced and the fill light is lit too long.
Likely cause(s); 1- The inlet is blocked. **2-** The vent path (main airline) is blocked/restricted. **3-** If flow induced, the inducer is plugged or its' exhaust path is restricted. **4-** If flow induced, the flow inducer is not getting compressed air.
5- The probe is not picking up the fluid and needs a more sensitive setting (see next page).
In cases 1-3, inspect and clear.

TROUBLESHOOTING CONTINUED

To change/reset the sensitivity of the probes: <u>(this procedure is rarely required when pumping conductive sludges and slurries).</u> Usually the combination of wastewater and solids produces so many ions that the liquid is very conductive. If your application falls into this category just leave the "Sensitivity Adjustment" knob near the "Low" setting, almost all the way counterclockwise (this is the standard factory '3' setting it is shipped with).

However, if your liquid is only mildly conductive, you may need to set the sensitivity higher to be able to detect it. Please follow this simple procedure to reset the sensitivity (see figure below).

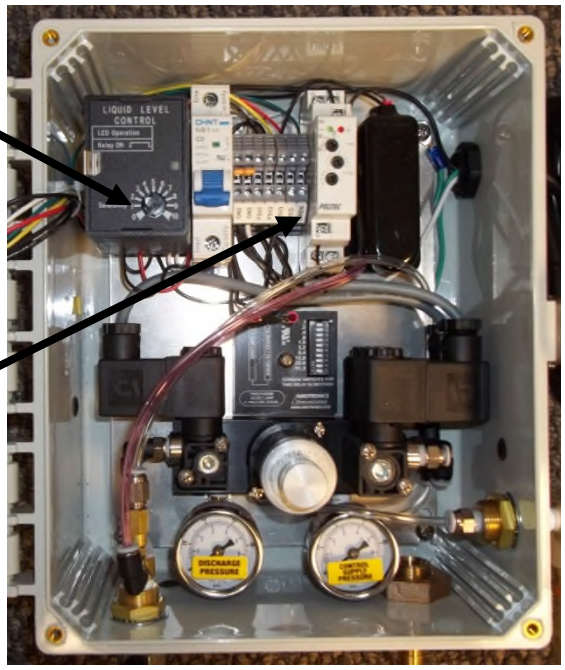
1- Remove the 'RED' and 'GREEN' probe wires from the probe terminals (marked below).
2- Add a length of temporary wire to each terminal that is long enough to reach a container of the liquid being pump.
3- Place both jumpers into the liquid so that they are not physically touching each other or the container side wall.
4- Starting at 'zero' increase the sensitivity adjustment until the discharge light comes on.
5- Pull the RED level wire out of the liquid. Observe that the discharge light goes on and off consistently with the insertion and removal of the RED wire from the liquid. Make any further sensitivity adjustments until this is the case. Use the least sensitive setting that will allow this consistent detection of the liquid.

PROBE TEST: When the issue has been a constant discharge, there is a highly conductive path to ground. If cleaning the probe and lowering the sensitivity has not corrected the problem, the probe itself needs troubleshooting. 1- Pull the probe and wipe it clean. 2- Using an ohm-meter, measure the resistance between the clamping disc and the tip of the probe. There should be infinite resistance; open circuit. If not, then the wiring may be cut/broken internally and the probe replaced.

Probe sensitivity-
'0' lowest, for very conductive fluids.
'1-5' for typical water based fluids.
'10" very barely conductive fluids

Connect temporary wires to the RED and GREEN terminals, and remove the existing red and green wires coming from the probe.

You must reconnect the probe wires after setting the sensitivity



Probe Test

Measure Ohms*

*with wires disconnected in panel

TROUBLESHOOTING CONTINUED

FAILURE CONDITIONS OF CONTROL PANEL COMPONENTS

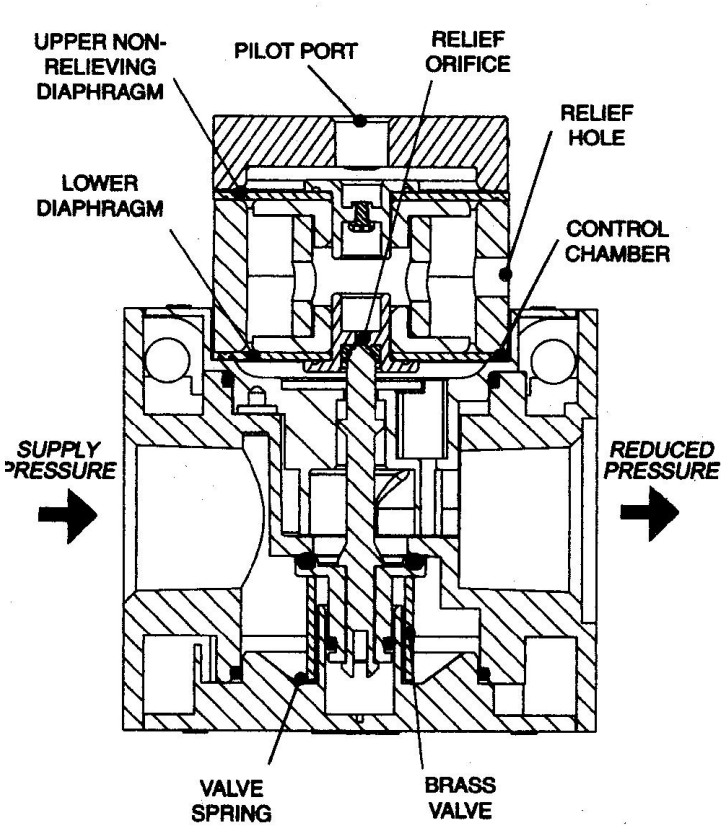
Discharge regulator: When debris is stuck under the poppet, the regulator will allow excess air pressure by, which it will try to vent out of its bonnet, causing a significant leak (hissing) at the bonnet. When the diaphragms are torn, the similar symptoms will occur: if the top diaphragm is torn, the pilot air signal will blow through making an audible leak and most likely the regulator will not open and pass air downstream. If the lower diaphragm is torn, there will also be an air leak but likely the regulator will open.
Clean or repair using the appropriate repair kit from the parts list. See cutaway view below.

REP50 and REP100 Discharge Regulators

Piloted discharge regulators: Both regulators have the same design/function and can fail in the same way. When debris is stuck under the poppet, the regulator will continuously allow excess air pressure by.

If the pump is filling, this blow-by air will be added to the pump exhaust air (and if the pump is flow induced, this extra air will defeat the vacuum of the flow inducer causing the pump not to fill). During the discharge mode the leaked air cannot be detected.

The easiest way to determine if the regulator is stuck open is to turn the panel power off with the air supply still on (after closing the main airline ball valve which will isolate the pump and force any leaked air to come out the exhaust valve). If you get compressed air exiting the exhaust valve then it is a pretty sure bet that the regulator poppet cannot close. Disassemble and inspect for obvious debris, wear, sticking.

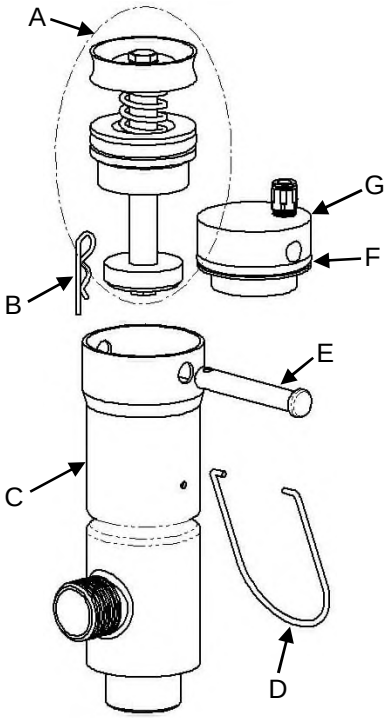


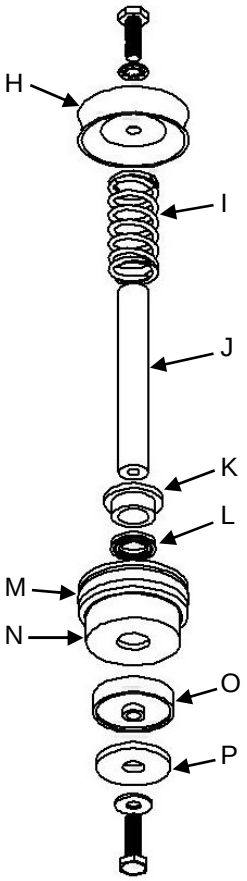
When the diaphragms are torn, different symptoms will occur. If the top diaphragm is torn, the pilot air signal will blow through, making an audible leak and most likely the regulator will not open and pass air downstream. If the lower diaphragm is torn, there will also be an air leak but is likely the regulator will open.
Clean or repair using the appropriate repair kits for the REP50/100K (contains both diaphragms, poppet assembly).

TROUBLESHOOTING CONTINUED

EXVS75 Exhaust valve: (used with SP310G2-G4 and SP310F2-F4 panels.

Failed open- will cause a lack of pressure in the pump during discharge, because the discharge air is blowing directly through the exhaust valve and not down into the pump. Liquid may spray from the exhaust. Also, the fill cycle will be relatively short like in a deadheaded condition because the pump chamber is not empty at the end of the discharge stroke.
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.

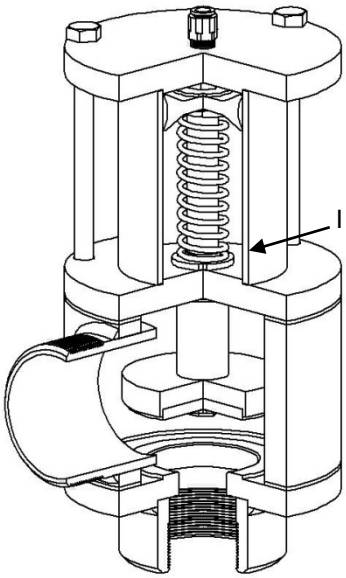


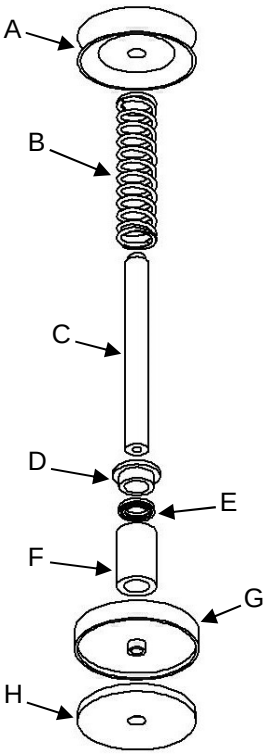


A – Exhaust valve internals
B – Cotter pin
C – Exhaust valve body
D – Spring D-ring
E – Clevis pin
F – Valve cap o-ring
G – Valve cap
H – Piston cup seal
I – Return spring
J – Shaft
K – Guide bushing
L – Wiper shaft seal
M – Seal housing o-ring
N – Shaft seal housing
O – Poppet back
P – Poppet seat

EXV200 Exhaust valve: (used with SP310G(4X3), SP310G6-G8 and SP310F(4X3), SP310F6-F8 panels)

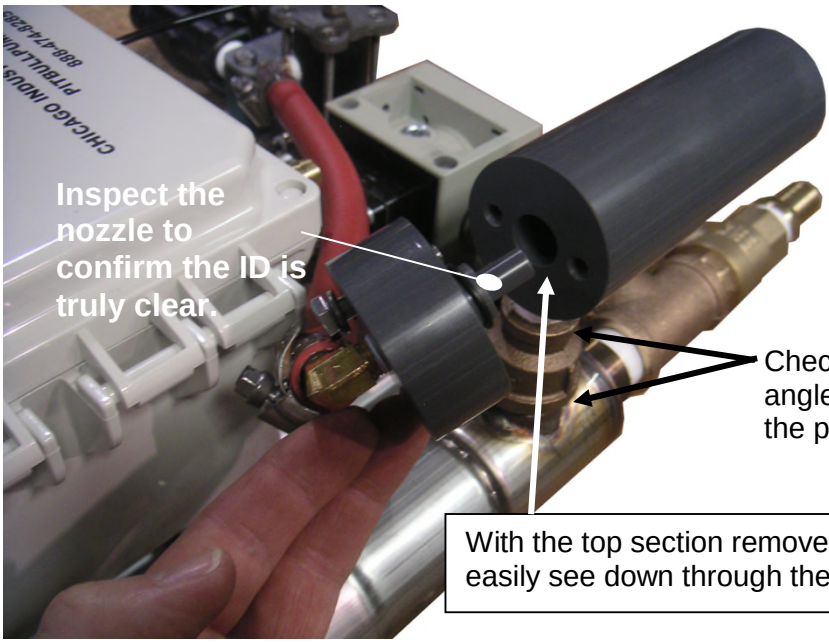
This valve operates with the same in principle as the *EXVS75.* Failure modes will also be the same.





A – Piston cup seal
B – Return spring
C – Shaft
D – Guide bushing
E – Wiper shaft seal
F – Spacer
G – Poppet back
H – Poppet seat

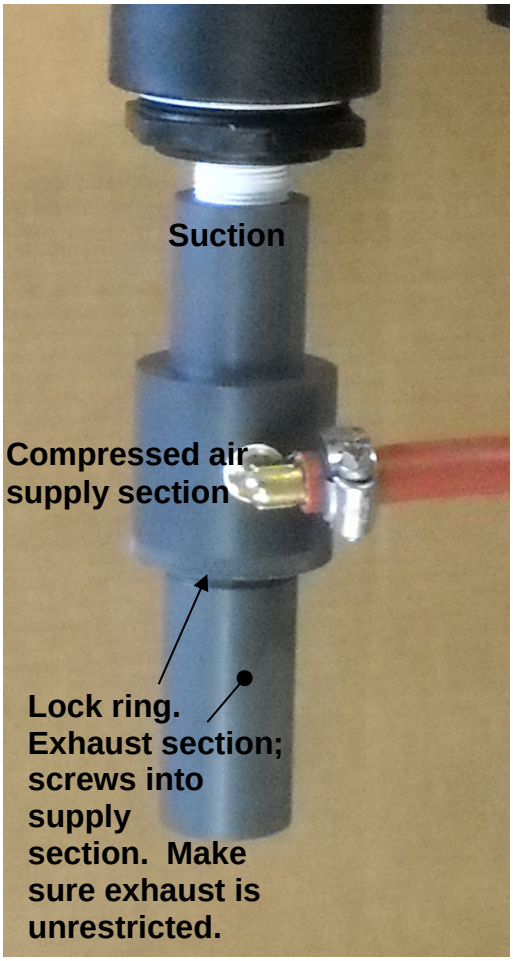
FLOW INDUCER TROUBLESHOOTING AND REPAIR



Flow Inducers with side vacuum port
(F3 shown)

The bore must be clear/smooth or the vacuum flow will not happen *even if the unit sounds like it is working.* Remove the top and look through the bore. Clean with water/soap if needed and/or use a plastic bristle cylinder brush.

Check between exhaust valve and right angle turn into the bore for debris clogging the path.



Flow Inducers with top vacuum port

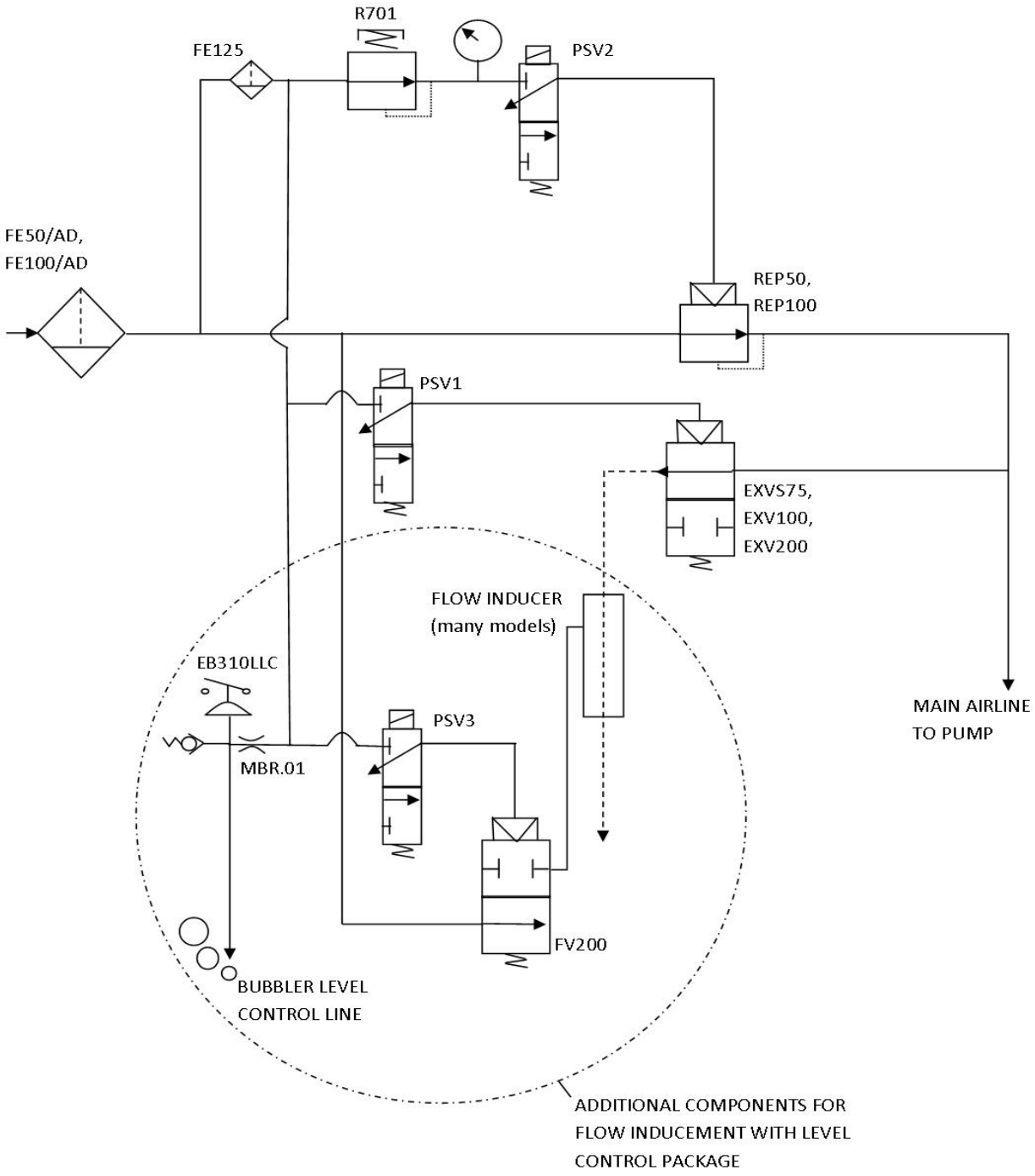
This style flow inducer has the air supply in the side and pulls vacuum in the top and exhaust out the bottom. There are (3) sections, suction, supply and exhaust.

First inspect the flow path by looking through from the suction out the exhaust. If all clear, then there is either an air supply problem or an adjustment problem (this is assuming there is nothing connected to the exhaust; remove any muffler or tubing before troubleshooting).

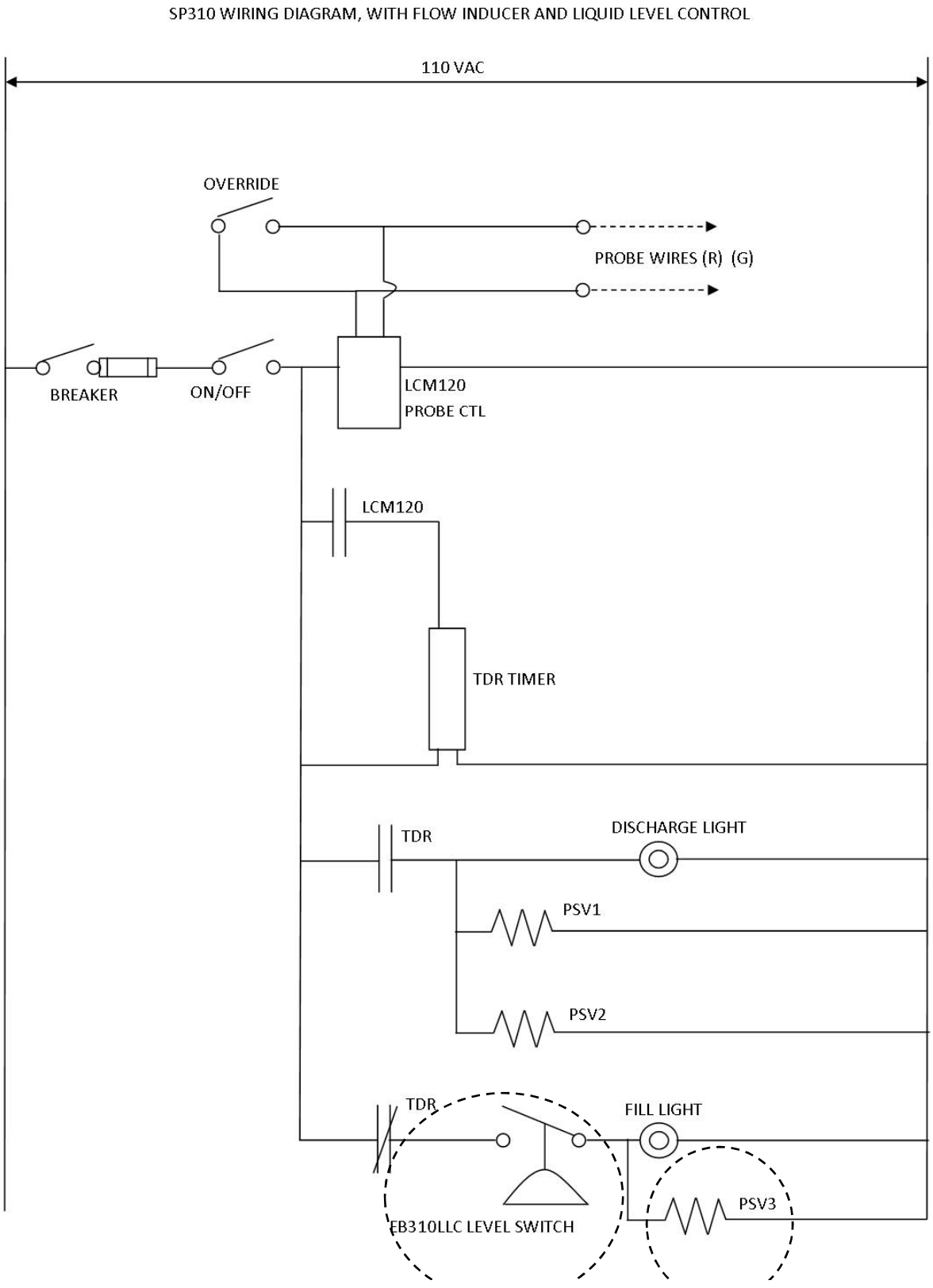
Air supply- remove the supply hose from the hose barb and confirm there is plenty of air flow and pressure (need 60 psi or more).

Adjustment- loosen the locking ring and with fingers only, screw the exhaust section up into the fatter supply section until it bottoms. **use low force!! These are fine threads and can be stripped or crossthreaded easily.
When bottomed out, this is '0' degrees; from here start unscrewing. At 270 degrees out from '0' (3/4 of a turn) there will be good flow and suction. Maximum flow and maximum air consumption will occur at 2 full turns out. 1.75 turns is generally the maximum needed and is too much flow for any pump with an intake smaller than 6".

SP310 PID

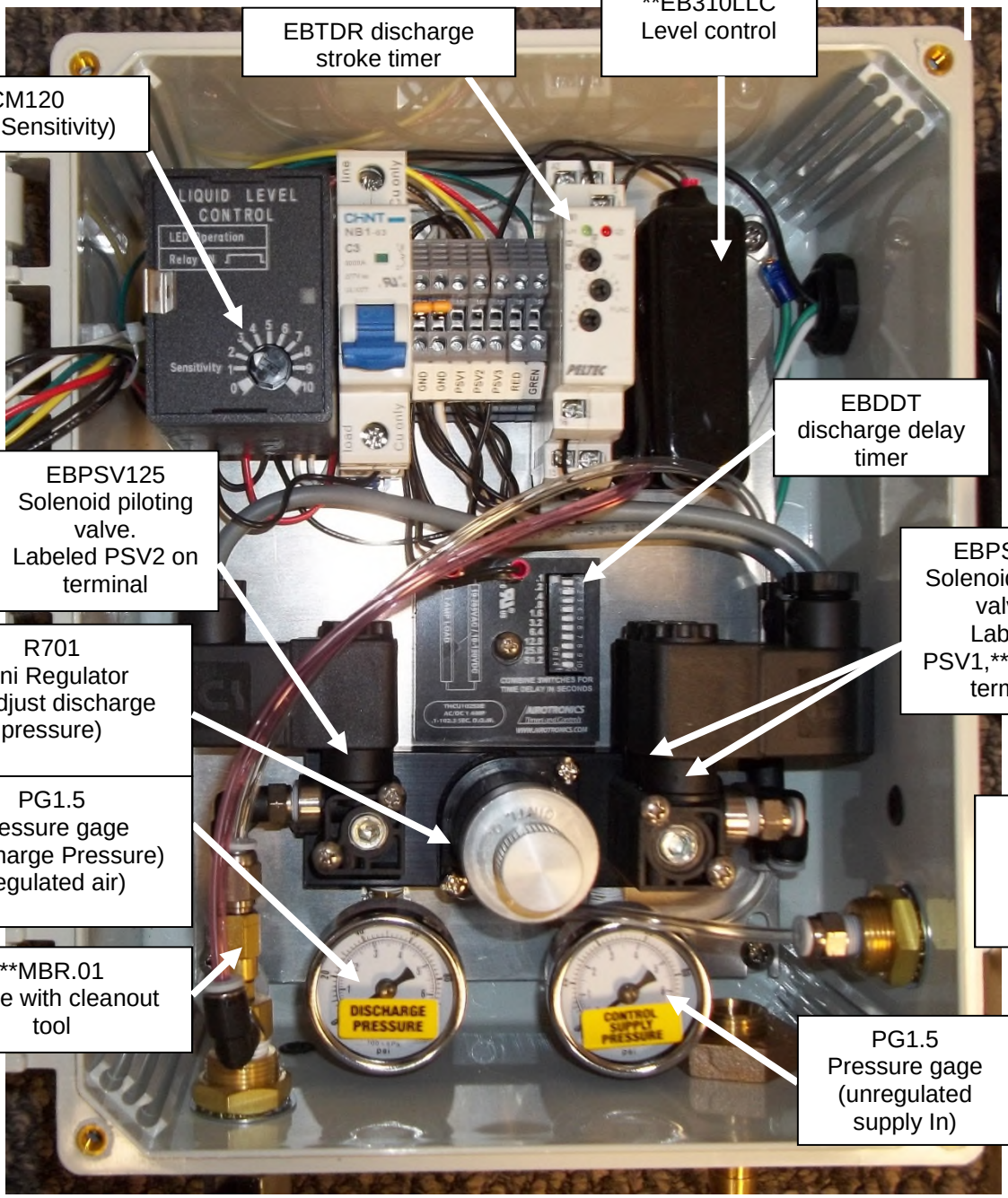

R701
FE125
PSV2
FE50/AD,
FE100/AD
REP50,
REP100
PSV1
EXVS75,
EXV100,
EXV200
FLOW INDUCER
(many models)
EB310LLC
PSV3
MBR.01
MAIN AIRLINE
TO PUMP
FV200
BUBBLER LEVEL
CONTROL LINE
ADDITIONAL COMPONENTS FOR
FLOW INDUCEMENT WITH LEVEL
CONTROL PACKAGE

SP310 WIRING DIAGRAM



PSV3 is included on <u>all flow induced options</u>. The Level Switch is included only on level controlled (LLC) flow induced options

INNER CONTROL PANEL COMPONENT IDENTIFICATION



EBTDR discharge stroke timer

**EB310LLC Level control

LCM120 (Probe Sensitivity)

EBDDT discharge delay timer

EBPSV125 Solenoid piloting valve. Labeled PSV2 on terminal

EBPSV125 Solenoid piloting valves. Labeled PSV1,**PSV3 on terminal

R701 Mini Regulator (to adjust discharge pressure)

PG1.5 Pressure gage (Discharge Pressure) (regulated air)

F125 1/8” GP Filter (outside of enclosure)

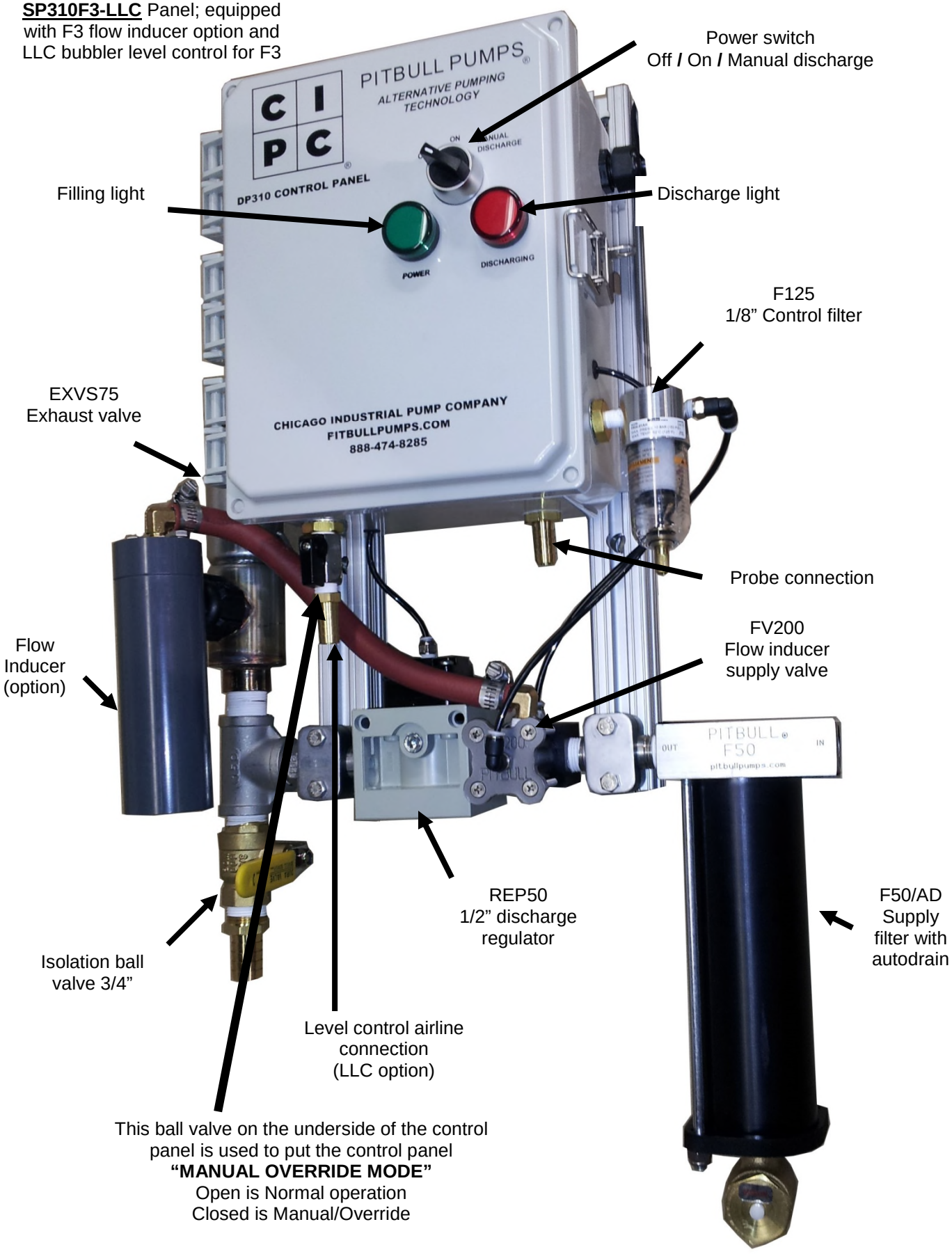
**MBR.01 Orifice with cleanout tool

PG1.5 Pressure gage (unregulated supply In)

Items preceded by (**) are only included with ‘flow induced with level control option’ (SP310F3-LLC for example).

CONTROL PANEL COMPONENT IDENTIFICATION

SP310F3-LLC Panel; equipped with F3 flow inducer option and LLC bubbler level control for F3



Power switch
Off / On / Manual discharge

Filling light

Discharge light

F125
1/8” Control filter

EXVS75
Exhaust valve

Probe connection

FV200
Flow inducer
supply valve

Flow
Inducer
(option)

REP50
1/2” discharge
regulator

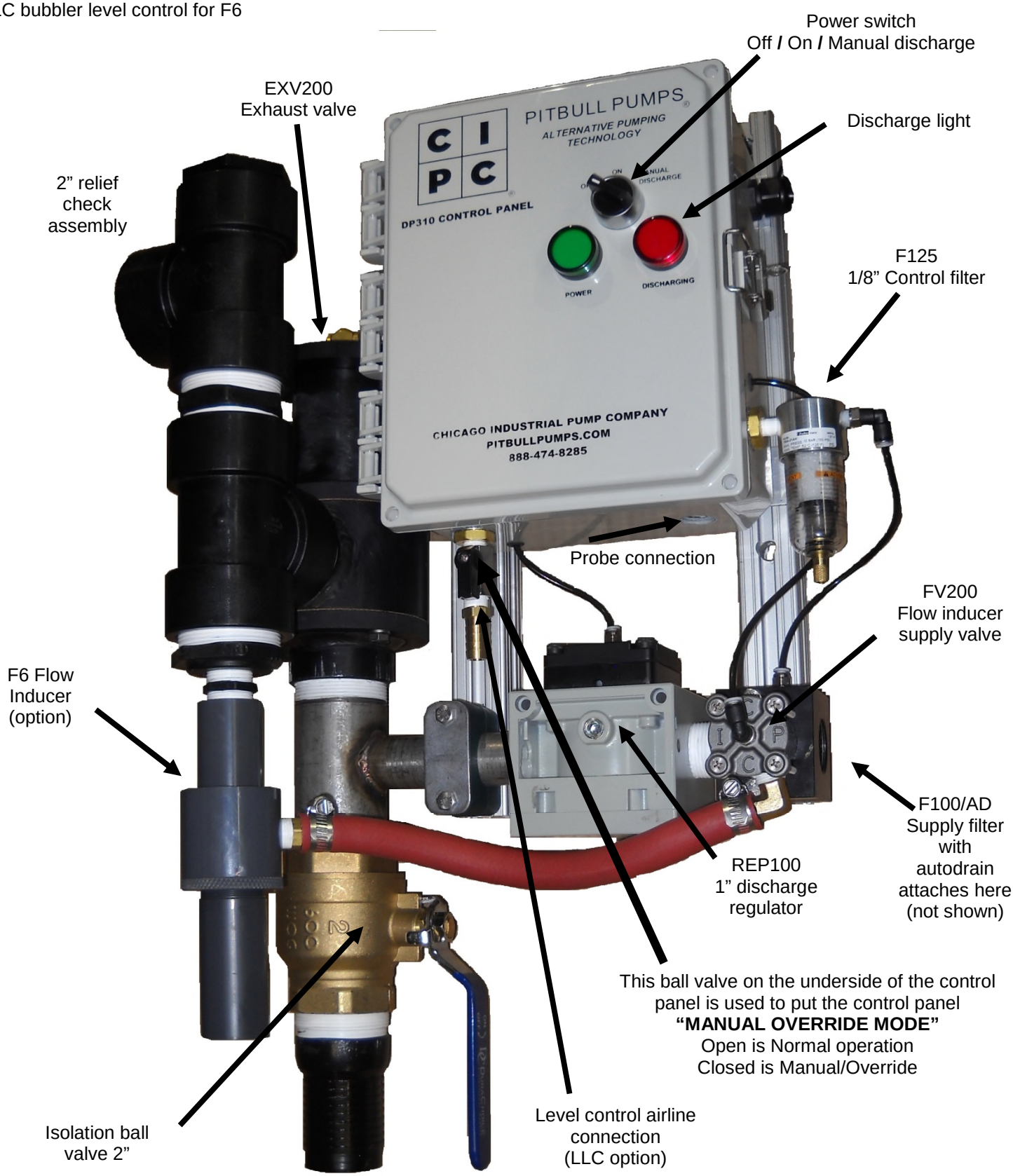
F50/AD
Supply
filter with
autodrain

Isolation ball
valve 3/4”

Level control airline
connection
(LLC option)

This ball valve on the underside of the control panel is used to put the control panel
“MANUAL OVERRIDE MODE”
Open is Normal operation
Closed is Manual/Override

SP310F6-LLC Panel; equipped with F6 flow inducer option and LLC bubbler level control for F6



SP310 CONTROL PANEL SPARE PARTS AND COMPONENTS

Note: all panels share the enclosure and internal components. The differences are in the size of discharge regulators and exhaust valves. All other parts are interchangeable.

Part #	Description
	Complete control panels with all valving and filtration
SP310G2	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain for S and T-series 2" pumps.
SP310G3	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain for S and T-series 3" pumps.
SP310G4	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain for S and T-series 4" pumps.
SP310G6	Electronic-pneumatic control panel use with single point probe) complete with 1" filter/auto-drain for S and T-series 6" pumps.
SP310F2-LLC	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain and F2 (adjusted for 2" pump) flow inducer with level control for S and T-series 2" pumps.
SP310F3-LLC	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain and F3 (adjusted for 3" pump) flow inducer with level control for S and T-series 3" pumps.
SP310F2-LLC	Electronic-pneumatic control panel (use with single point probe) complete with 1/2" filter/auto-drain and F4 (adjusted for 4" pump) flow inducer with level control for S and T-series 4" pumps.
SP310F6-LLC	Electronic-pneumatic control panel (use with single point probe) complete with 1" filter/auto-drain and F6 flow inducer with level control and 2" relief check for S and T-series 6" pumps.
EBTDR	Discharge delay timer
EBPSV125	1/8” Solenoid valve
EB310LLC	Level control
EXVS75	Complete 3/4" stainless exhaust valve, viton seat, nitrile seal.
EXVS75IN	Complete drop in replacement internal assembly
EXVS75S	3/4" SS exhaust valve seat, and seal rebuild kit
EXV200	2" exhaust valve.
EXV200K	2" exhaust valve rebuild kit
F125	1/8” Control filter
FE125	Element for 1/8” control filter
LCM120	Probe control
MBR.01	Bubbler orifice (orifice and clean-out tool)
PG1.5	Discharge pressure gage.
REP50	1/2" piloted discharge regulator.
REP50K	1/2" piloted discharge regulator repair kit.
REP100	1" piloted discharge regulator.
REP100K	1" piloted discharge regulator repair kit.
REP150	1-1/2" piloted discharge regulator.
REP150K	1-1/2" discharge regulator (pilot operated) repair kit.
R701	Mini regulator
CPH50-6	Stainless probe, quick-clamp style 2-wire,1/2x6", PVC insulator, with 15' nitrile hose jacket.

FLOW INDUCERS

F2	Flow inducers for 2" pumps
F3	Flow inducers for 3" pumps
F4	Flow inducers for 4" pumps
F6	Flow inducers for 6x4 and 6” pumps
F8	Flow inducers for 8” and larger pumps

* Flow inducers should be exhausted into large diameter, rubber hose or approved mufflers.

MUFFLERS

ST-6B	Muffler for F2–F3 flow inducers
ST-12C	Muffler for F4–F8 flow inducers

AIR SUPPLY FILTERS

F50/AD	1/2" filter with high flow autodrain
FE50	40 micron filter element for F50 filter
F100/AD	1" filter with high flow autodrain
FE100	40 micron filter element for F100 filter
F150/AD	1-1/2" filter with high flow autodrain
FE150	40 micron filter element for F150 filter

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.

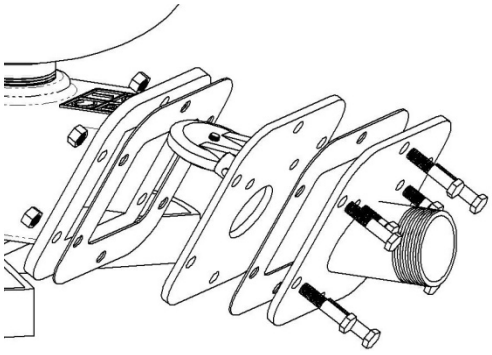


Fig 14A

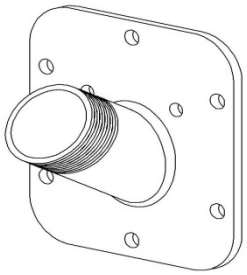


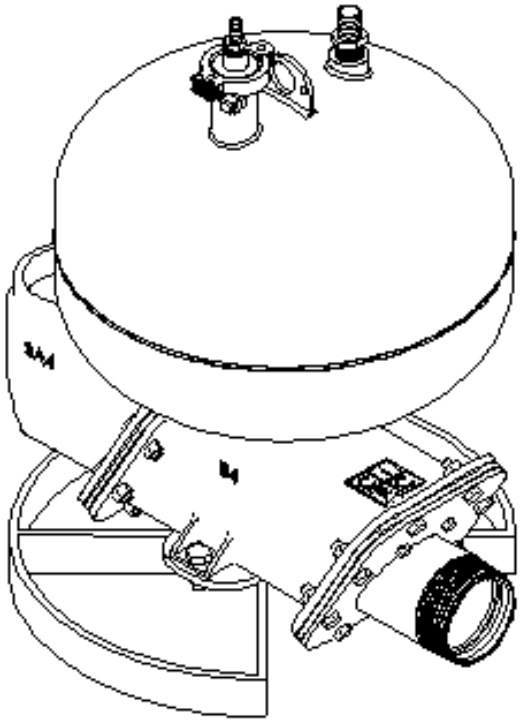
Fig 14B

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, descriptions and a table of seat material options.

Seat Material Selection Properties

SEAT MATERIAL	DESCRIPTION
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	Good 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.
PVDF	Excellent chemical and solvent resistance, toughness for abrasion and temperature resistance to 250F.



For pumps with this configuration (with or without the threaded inlet adapter) the pump model numbers are S2C/S2S thru S4C/S4S and T2C/T2S thru T4C/T4S. Both submersible and transfer pumps use the same check valve for a given size/material.

Matching check valves are listed starting on the next page.

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CIPC CHECK VALVES CONTINUED

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
(P)	PVDF 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
(P)	PVDF 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*.

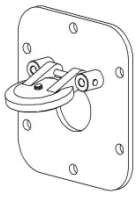


Fig 20A


Fig 20B

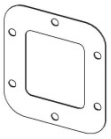


Fig20C

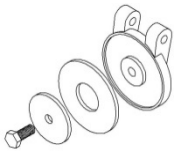


Fig20D

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
(P)	PVDF 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
(P)	PVDF 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*.

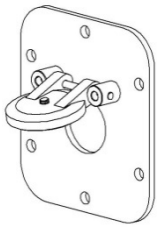


Fig 20A


Fig 20B

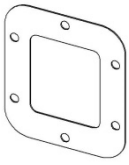


Fig20C

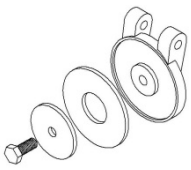


Fig20D

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
(P)	PVDF 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
(P)	PVDF 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*.

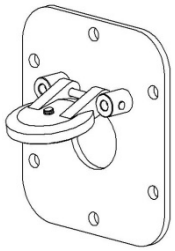


Fig 20A


Fig 20B

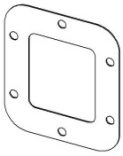


Fig20C

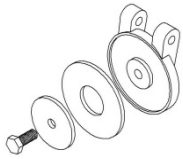
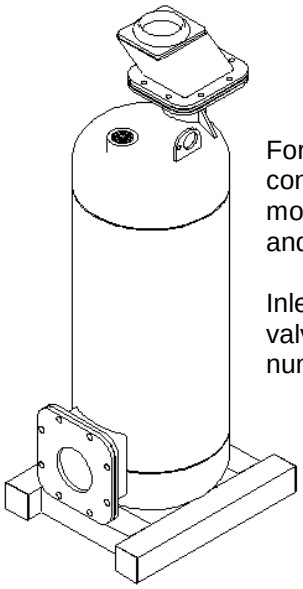


Fig20D

CIPC SIDE INLET CHECK VALVE ASSEMBLIES

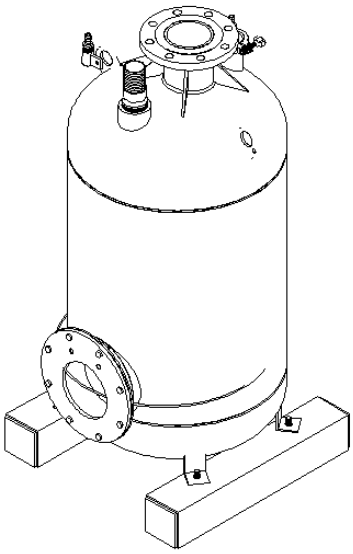


For pumps with this configuration the pump model numbers are S4X3S and S3X2S submersibles.

Inlet and discharge check valves are different part numbers.

For pumps with this configuration the pump model numbers are S6X4C/S6X4S and S8X6C/S8X6S submersibles.

Inlet and discharge check valves are different part numbers.



3SICV(_)	**3"**	CIPC side inlet internal swing check, stainless steel, for 3” side inlet pumps
3CVF/(_)	**3"**	Flapper (316SS)

Seat adders for check valve flappers

(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
(P)	PVDF 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
(P)	PVDF seat for 3” check

CIPC SIDE INLET CHECK VALVES CONTINUED

4SICV(_)	**4”**	CIPC side inlet internal swing check, stainless steel for 4” side inlet pumps
4CVF/(_)	**4"**	Flapper (316SS)

Seat adders for check valve flappers

(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
(P)	PVDF 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
(P)	PVDF seat for 4” check

6SICV(_)	**6"**	CIPC side inlet internal swing check, stainless steel, for 6x4 and 6” side inlet pumps
6SICV(_)-DT	**6”**	CIPC side inlet internal swing check, stainless steel, with low level downtube, for 6x4 and 6” side inlet pumps
6CVSK(_)	**6"**	**Seat kit (2 seats), for 6” checks**

(N)	Nitrile seat for 6" check
(V)	Viton seat for 6" check
(T)	Teflon seat for 6" check
(UHD)	Heavy duty urethane seat for 6” check
(E)	EPDM seat for 6" check
(P)	PVDF seat for 6” check

8SICV(_)	**8"**	CIPC side inlet internal swing check, stainless steel, For 8” side inlet pumps
8SICV(_)-DT	**8”**	CIPC side inlet internal swing check, stainless steel, with low level downtube, for 8” side inlet pumps
8CVSK(_)	**8"**	**Seat kit (2 seats), for 8” checks**

(N)	Nitrile seat for 8" check
(V)	Viton seat for 8" check
(T)	Teflon seat for 8" check
(UHD)	Heavy duty urethane seat for 8” check
(E)	EPDM seat for 8" check
(P)	PVDF seat for 8” check

DISCHARGE CHECK VALVES FOR S4X3S & S3X2S

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

Seat adders for check valve flappers

(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 4" 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)*
2CVP/S(_)	**2"**	**CIPC 316SS swing check, plate style, full port, complete assembly.** *(Fig 20A)*
2CVF/(_)	**2"**	**Flapper (316SS)** *(Fig 20B, 20D exploded)*

Seat adders for check valve flappers

(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)*

** *(2) gaskets required for submersible (2 spares)*

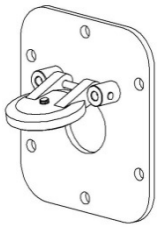


Fig 20A


Fig 20B

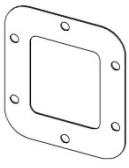


Fig20C

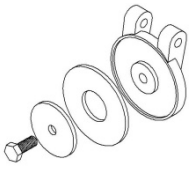


Fig20D

CIPC WAFER CHECK VALVES

(used as discharge checks on 6” and 8” inlet pumps)

4WCV(_)	**4"**	CIPC stainless steel wafer swing check, full port, for 4” high flow and 6x4 pumps
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
(P)		PVDF seat for 4” check
6WCV(_)	**6"**	CIPC stainless steel wafer swing check, full port, for 6” pumps
6CVSK(_)	**6"**	**Seat kit (2 seats), for 6” checks**
(N)		Nitrile seat for 6" check
(V)		Viton seat for 6" check
(T)		Teflon seat for 6" check
(UHD)		Heavy duty urethane seat for 6” check
(E)		EPDM seat for 6" check
(P)		PVDF seat for 6” check
8WCV(_)	**8"**	CIPC stainless steel wafer swing check, full port, for 8” pumps
8CVSK(_)	**8"**	**Seat kit (2 seats), for 8” checks**
(N)		Nitrile seat for 8" check
(V)		Viton seat for 8" check
(T)		Teflon seat for 8" check
(UHD)		Heavy duty urethane seat for 8” check
(E)		EPDM seat for 8" check
(P)		PVDF seat for 8” check

To order, contact **CIPC** with your pump serial number

ALL RUBBER FLAPPER CHECK VALVES

For 2”, 3”, and 4” submersible and transfer 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. To be used only for specific, qualifying applications.

Contact **CIPC** with your specific pumping application for rubber hinged check valve part numbers and pricing.