Print Head Recovery Quick Guide with Print Head Doctor 7

WARNING: Print heads can be damaged by excessive use of ultrasound, pressure, temperature and aggressive chemicals. It is always a good idea to minimize the risk of a print head damage by using no ultrasound, low pressures, low temperatures and using less aggressive recovery fluids (1X, 1UV, 1DX, 1W). If no progress can be made this way, you can start introducing short periods of ultrasound, warming up the fluids, and using more aggressive chemicals.

Print Head Sensitivity

Here is the list of print heads sorted by sensitivity in an ascending order. Less sensitive print heads can handle more pressure, temperature, ultrasound and chemistry. Less sensitive heads can be cleaned starting with Step 3 below. Others should go through steps 1 and 2. If you are working with Epson heads, please read the Quick Guide for Epson head recovery with PHD8 or PHD6, as these heads are way too sensitive and require extra care.

Spectra S-class (SL128, SM128, SE128)	**Very low sensitivity.**	Spectra Q-Class	Medium to high sensitivity.
Spectra Nova and Galaxy	**Low sensitivity.**	Ricoh Gen4	Medium to high sensitivity.
Konica-Minolta KM512	Medium sensitivity.	Xaar 500	Medium to high sensitivity.
Konica-Minolta KM256	Medium sensitivity.	Xaar 1001	Medium to high sensitivity.
Konica-Minolta KM1024	Medium sensitivity.	Kyocera KJ	High sensitivity.
Xaar 128	Medium sensitivity.	HP Aprion	High sensitivity.
Seiko SPT510 and SPT508	Medium sensitivity.	Epson DX4	**Very high sensitivity.**
HP X2*	Medium sensitivity.	Epson DX5	**Very high sensitivity.**
Hitachi (Ricoh) Gen3	Medium sensitivity.	Epson - all other models	**Very high sensitivity.**
		Canon PF-03	**Very high sensitivity.**

*We recommend using the MF10 cleaning solution for HP X2 print heads. It is available from HP and it's fully approved to use on PHD machines.

Explanation of the Recovery Cycles

Dr - Drain Cycle - is used to empty the tank, or when you need to pump fluids in a forward direction for a short time.
Ar - Air Cycle - is used to purge the fluid out of the internal filter and tubing. Do not start Air cycle when a print head is connected, as it will over-pressurize it.
C1 - Combined Normal - pumps the fluid into the print head and sucks it out of the RF cap, with 5% of ultrasonic time.
C2 - Combined Easy Cycle - same as C1 but without using any ultrasound.
C3 - Combined Strong Cycle - same as C1 but with more ultrasound: 30% of the cycle time.
F1 - Forward Normal Cycle - only the pressure pumps will work (no vacuum), with 5% of ultrasonic time.
F2 - Forward Easy Cycle - same as F1 without using any ultrasound.
F3 - Forward Strong Cycle - same as F1 but with more ultrasound: 30% of the cycle time.

Useful Tips

Protect your print head's electronics from the fluids. Wrap the areas where fluids may get on the electronics with tape. Make sure that the print head is submerged into the fluid by only 3mm (1/8") and not deeper.

Do not clean your print head for too long. One hour a day will be enough. Purge the print head with a weak flush and then with air, gently pushed by a syringe, and let it sit for a day without any fluids inside. Before installing the print head on your printer, test the nozzles by pushing the flushing solution that came with your ink through the print head using a syringe. Do not apply too much pressure. Once you see the nozzles are in a good condition, put the head on the printer. Otherwise you'll need to re-flush it.

Do not use alcohol to clean the electronics of a print head. If you want to remove moisture from the electronic parts, use the spray-on Contact Cleaner that can be found in automotive parts stores.

Precautions on Epson Heads

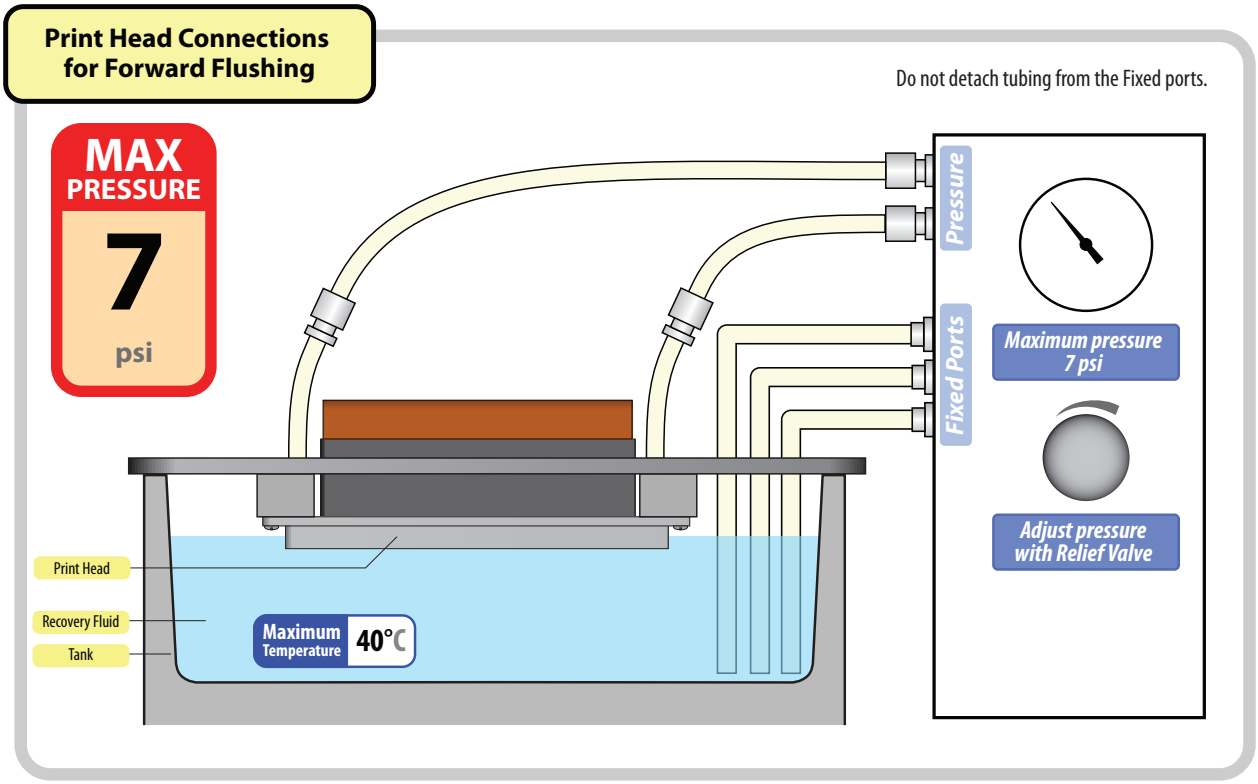
Epson heads are extremely sensitive to everything. Follow these precautions to keep them safe during recovery, and disregard the pressure settings shown on the diagrams in this document. Epson heads cannot handle any kind of pressure applied to the input ports. Keep the print head pressure at a maximum of 2 psi.

Do not use any ultrasound, as it will damage Epson heads if applied for too long. When it's absolutely necessary to use the ultrasound, keep it on for a maximum of 30 seconds. The recovery cycle to use: F2 (Forward-Easy). Do not pre-heat the recovery fluid, let it run at a room temperature. Watch the temperature: it should not get warmer than 30°C.

The most effective way of cleaning Epson heads is by using a vacuum-assisted forward flushing method with the maximum forward pressure of 2 psi. There is no limit to the vacuum: it can be as high as it gets. Vacuum cannot damage print heads.

Notice on HP X2 Print Heads

We recommend using the original HP solution called MF10 to clean HP X2 print heads. This solution is approved for use on the Print Head Doctor machines.



Print Head Recovery Steps

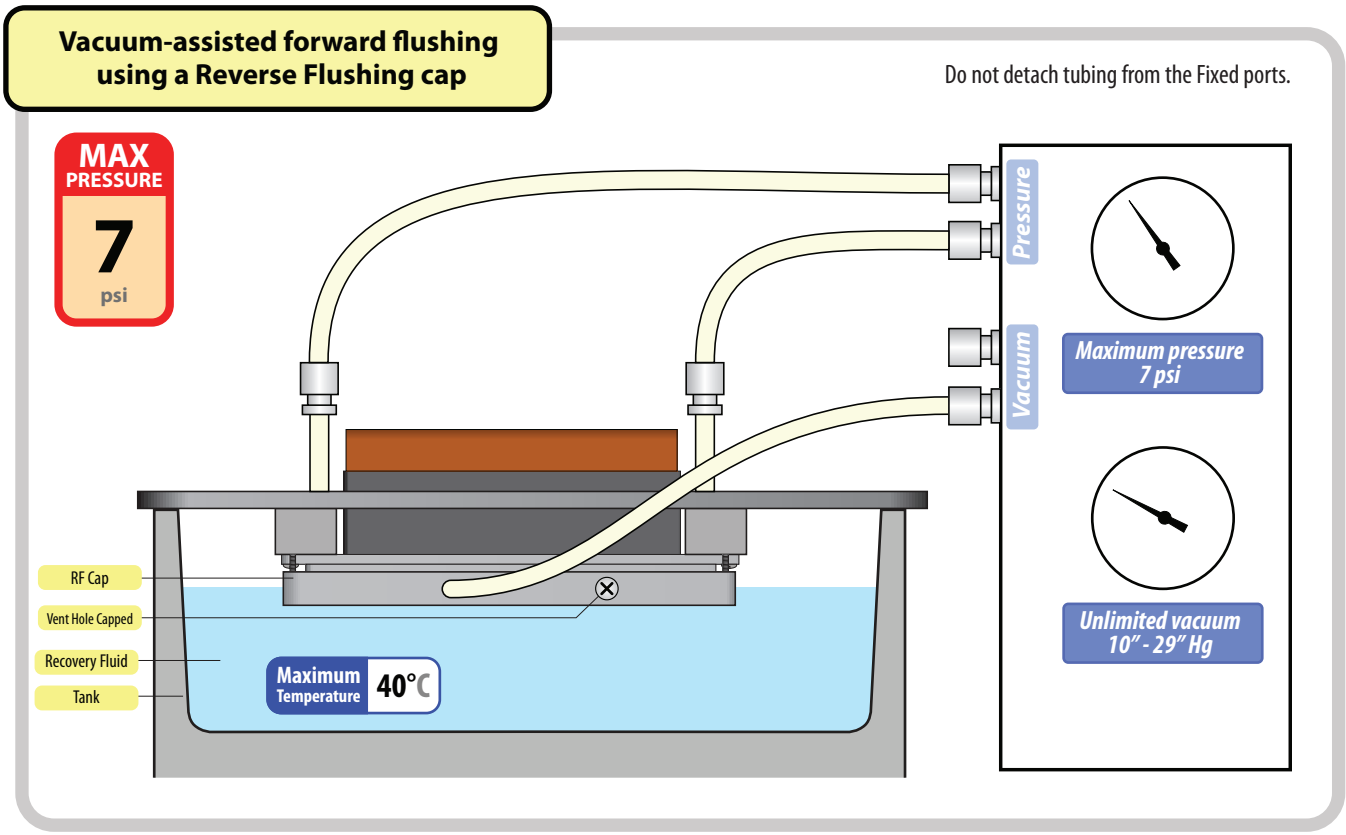
If you have a Reverse Flushing Cap for your print head, you can jump directly to the Vacuum-Assisted Forward Flushing, as it's more effective then Forward Flushing alone.

Step 1. Light Flushing of Sensitive Print Heads
We will attempt to unclog your print head the safest way possible. Use fluid # 1X for solvent print heads, or 1UV for UV curable, or 1W for water-based ones. Do not set the temperature, but watch it not to exceed 30°C. Set up your print head as shown on the picture. Open the relief valve. Start the Drain cycle and watch the Print Head Pressure. Using the Relief Valve, adjust the pressure to be around 6 psi. Lift the print head for a moment to see the condition of the nozzles. Stop the cycle. Start the F2 (Forward Easy) cycle and let it run for 15 minutes. Watch the pressure: it should never exceed 7 psi. Adjust it when necessary. Check the nozzles. If you see an obvious progress, continue with the forward flushing for another full F2 cycle. If no progress has been observed, move on to Step 2.

Step 2. Medium Strength Flushing of Sensitive Print Heads
Continue with the less aggressive recovery fluid (#1). Start F1(Forward Normal) cycle. Check the nozzles after 10 minutes. If no progress has been made, you'll need to change the recovery fluid. Follow the fluid changeover instructions. Always keep an eye on the forward pressure (7 psi max). Re-check the nozzles and if there was no progress, move on to Step 3.

Step 3. Powerful Flushing of Robust Print Heads
Please note that this process poses a higher risk for sensitive print heads.
Run F3 (Forward Strong) cycle for a full length of it. Re-check the nozzles. If you see a great deal of improvement, repeat the F3 cycle. If no further progress is observed, change the recovery fluid to the next one, following the Fluid Changeover Instructions contained in a separate document. Repeat the F1 cycle with the new fluid. Robust print heads can handle as much as 4 hours of continuous flushing, while other heads should be flushed for no longer than 1...2 hours per day. If no improvement is taking place after each cycle, it means that the recovery fluid should be changed to another one.

When you're done cleaning a print head, flush it out with fluid 1X (or a distilled water for water-based heads), and fill it with the flushing solution that comes with your ink.



Vacuum-Assisted Forward Flushing

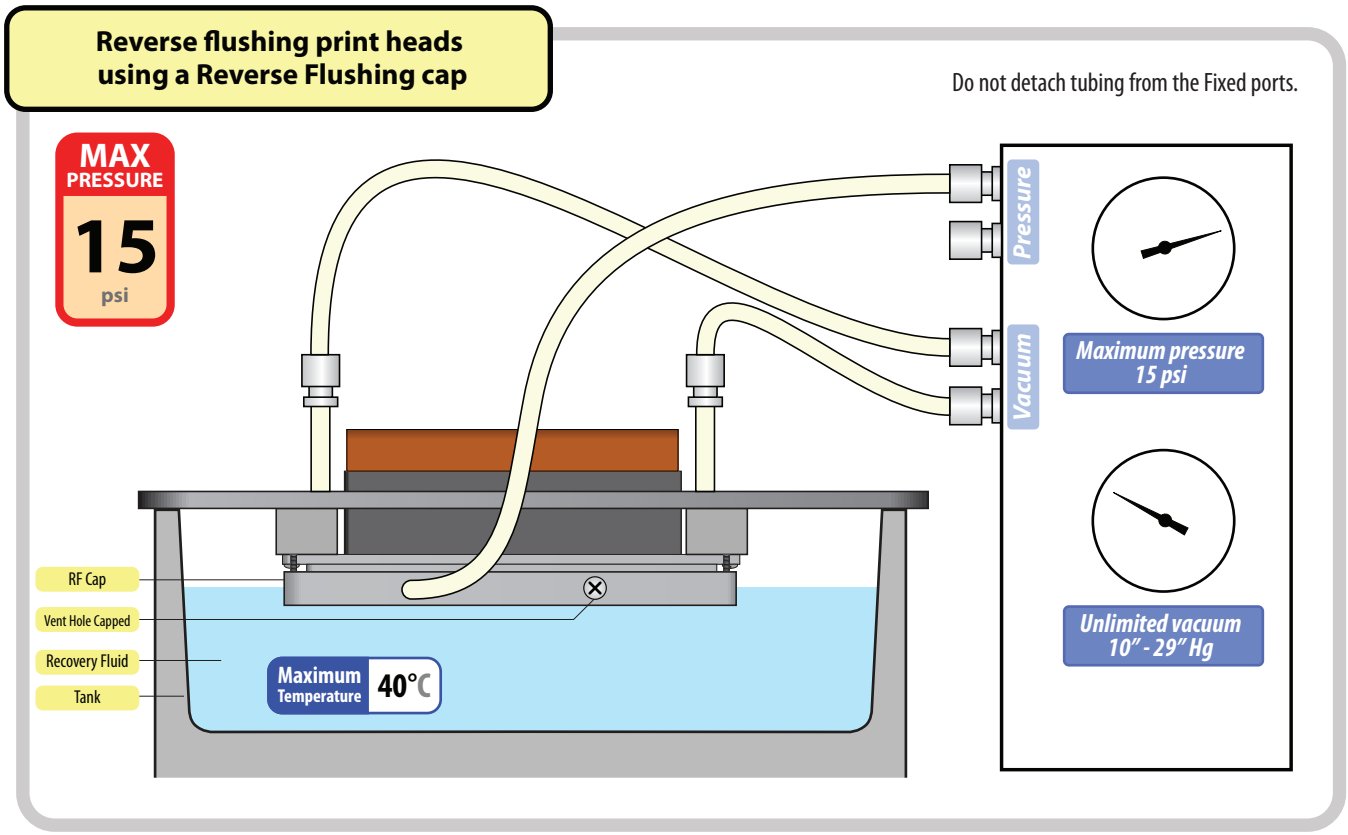
If you have a Reverse Flushing cap for your print head (RF cap), you can do a so-called vacuum-assisted forward flushing. The vacuum is applied to an RF cap attached to the nozzles of your print head, which sucks the fluid out of it, while pressurized fluid is supplied to the input ports of the print head. Pressure and vacuum work together to increase effectiveness of the cleaning. If you have 7 psi of pressure and 20″ of vacuum (20″Hg = 10 psi), it's the same as forward flushing the head with 17 psi of pressure if there were no RF cap, without exceeding the safe pressure of 7psi.

Set up your print head as show on the diagram above.

Run the C1 cycle (for Epson heads use only C2 with no ultrasound). Make sure the print head pressure does not exceed 7 psi. Very sensitive print heads will get damaged at 7psi, so you should keep it at no more than 2 psi. For Epson heads, keep the pressure at 1 psi.

Medium and Low sensitivity print head can be cleaned with cycle C3, which gives more ultrasound.

To get the highest effectiveness out of this flushing method, replace the small filters beforehand or make sure they are clean enough not to create too much resistance to the flow.



Reverse Flushing with an RF Cap

If you have a Reverse Flushing cap for your print head, here is another method of cleaning heavily clogged print heads. It will run the fluid in a reverse direction, pushing the clog out of the print head as opposed to pushing it through the nozzles, as it happens during the forward flushing.

Keep the vent hole capped with the screw.

First, we need to clean the inside of the RF Cap. **For sensitive heads**: run the Vacuum-Assisted Forward Flushing on C2 cycle for 15 minutes. **For less sensitive heads**: Install the RF Cap on a print head and conect it to the dummy port on the adapter plate. Connect the print head input to one of the pressure ports of the machine, and plug the other port. Run the F1 cycle for 15 minutes at a pressure not exceeding 5psi. Make sure the fluid is escaping from the dummy port on the adapter into the tank.

Connect the RF Cap to the pressure port and the print head to the vacuum port, as shown on the diagram above. Run the C1 cycle (for Epson heads use only C2 with no ultrasound). Because all the pressure is applied to the outside of the nozzles, it's safe to use a high pressure of up to 10 psi.

Medium and Low sensitivity print head can be cleaned with cycle C3, which gives more ultrasound.

After the reverse flushing, you should do a forward flushing and check the nozzles condition.