



PULSATOR[®] FLUSH GUN

Multi Purpose Pulsating Flusher

U.S. Patent No. 9233404

For high flow solvent pulse blasting thru A/C condensers & evaporators, transmission, engine, fuel, and other type oil coolers; heavy degreasing, and much more. Manufacturer highly recommends, and best results will always be found with the use of **HECAT[®] SAFE-FLUSH[®] Solvent.**

OPERATING INSTRUCTIONS

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SAFETY WARNINGS

THIS IS A VERY POWERFUL BLASTING DEVICE

Follow all proper safety practices. This item must be kept out of the reach of children. Safe use is your responsibility and you must read, understand, and follow all safety warnings. Because conditions of use are out of our control, Hecat, Inc. cannot be responsible for the potential misuse and the inherent hazards of using this tool. The Operator must completely understand and accept the responsibility and liability of the possible hazards, damage, and injury that could occur. If you are not willing to accept this responsibility and liability, it is recommended that you do not use this flusher.

- **This is a very serious high pressure-blasting device.** You must read and understand the entire manual before beginning use of this flusher.
- **Never point the discharge gun at any person. Always use safety trigger lock when not in use. Never leave pressure charged flusher unattended. Never store the flusher pressurized. Keep away from children.**
- **A spit back hazard exists,** if flusher tip is not sealed correctly or is deadheaded against a blocked component; always wear protective equipment, including safety goggles, face shield, and gloves when working with compressed air, chemicals, and solvents. Compressed air, chemicals, and solvents can and will cause severe injuries.
- **The manufacturer cannot be responsible for any damage done** to a component being cleaned or secondary damage occurring with the use of this system. 90 PSI is the recommended maximum operating pressure and it is the Operators responsibility to regulate the air pressure lower, if needed, to limit component and secondary damage or injury. Be very aware of what the solvent you have chosen will do to paints and finishes, as a clear solvent over spray hazard exists.
- **Operator must obtain and read MSDS** to be familiar with the proper handling, disposal, and other hazards of the chemicals and or solvents chosen for use.
- **Operator must be familiar with the dangers** of and take all necessary precautions when working with pressurized air systems and components.
- **Operator must comply with any and all Federal, State, and local laws** governing the use of this equipment and the solvent chosen for use. As well as the proper disposal of solvents, the equipment, and any of its components.
- **Be very aware of the Toxicity and Flammability rating of the solvent chosen.** Because solvents fumes and mist are present at the exhaust of the flushing system, this equipment should only be used in locations with proper mechanical ventilation.
- **Call Manufacturer's Tech Line (1-800-380-9501)** before attempting any repair or if you have any questions about the safe and proper use of this flusher. Repairs are to only be performed by trained and approved service technicians.

“PULSATOR FLUSH GUN”

“RECOMMENDED FLUSHING PROCEDURES”

NOTE: Complete or partially assembled systems cannot be flushed. You cannot flush through fill or service ports. You must always isolate the heat exchanger and flush through the hoses or the most direct and unrestricted path to obtain the most satisfactory flushing results. For A/C flushing; do not attempt to flush through compressors, orifice tubes, TXV's, accumulators, or filter/dryers; these items must be replaced or serviced by other means.

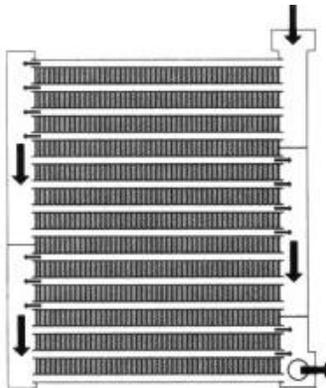
TRANSMISSION AND OTHER OIL COOLERS

Transmission (in radiator) and many other oil coolers are usually of an open mesh design and work as great filters. These units must be **backflushed** first, to back out metal debris and clutch material. Observe the debris outflow into the capture bucket and repeat flushing if necessary. Flow verification can be completed while flushing (not with small tip). A strong pulse usually indicates good flow and this can be confirmed by timing (about 90 seconds) the complete use of the 1 gallon of liquid, which is combined with a substantial volume of air. If flow verification cannot be completed with the flusher for any reason, we do recommend performing the generic OEM flow test by measuring the transmission fluid out flow of the cooler return line at 2 quarts in 30 seconds.

A/C CONDENSERS

For years, flushing Condensers has been very successful and there have been no major issues with flushing the simple pathways of the “Tube & Fin” or “Serpentine” designed Condensers. The most common Condenser flushing issues today are associated with the “Parallel Flow” Condensers (PFC) and the phenomenon of “Black Death” or “Compressor Burnout”.

The following information is provided as a basic guide to flushing a condenser and cannot cover all the possible scenarios a technician may encounter.



◀ The arrows in this picture to the left are indicating the normal refrigerant flow path. In some PFC designs, a serviceable filter/dryer will be found as an integrated component. The filter/dryer desiccant bag and screen must be removed and the housing resealed before attempting to flush.

Condensers will have the inlet usually located at or near the top, and the outlet will usually be located at or near the bottom of the unit. As with most heat exchanger flushing, this unit should be back flushed first (bottom to top), in the opposite direction of normal refrigerant flow. This is done to back out debris that cannot be driven through the small passageways. Monitor the recovery bucket for debris removal, stop flushing and clean as necessary, and repeat flushing if necessary; until out flow is showing clean. Now swap the hoses and perform the air purge process in the opposite direction (top to bottom) to be sure all the solvent is removed.

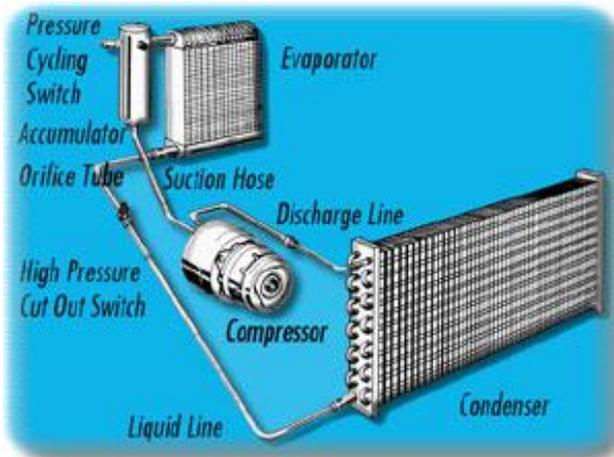
In cases of extreme high debris loads such as a catastrophic compressor failure, it may be necessary to even remove the PFC from its mountings and position the component to allow for gravity to assist in removing the larger metal pieces during the flushing process. A good understanding of the internal flow paths and design of the component being flushed is necessary to select the correct position. Back

flushing in the correct position, will provide for good debris removal and solvent removal and usually can be accomplished with one flush.

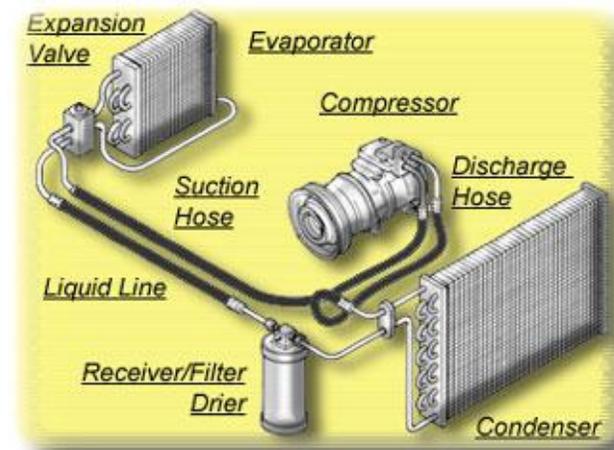
You can flush back and forth as much as you wish. Always make the final air purge in the normal refrigerant flow direction (top to bottom) to allow for the complete removal of the flushing solvent.

A/C EVAPORATORS

Successful flushing of A/C evaporators has proven to save technicians the time and frustration related to the difficulty of in dash replacement, eliminates the guessing about how much waste oils are remaining and the concern of unknown debris, and reduces the overall repair cost, which will turn quotes into jobs. The following information is provided as a basic guide and does not cover all possible scenarios.



Common Orifice Tube (OT) systems will usually have an Accumulator located between the Evaporator and Compressor and the debris load is limited to what can pass through the OT and its screen. The Evaporators inlet is the lower or smaller of the two ports. Usually only one flush in the back flush direction by flushing in through the larger or upper port is required. Monitor the recovery bucket for debris removal, stop flushing and clean as necessary, and repeat flushing if necessary; until the out flow is showing clean. Follow up with the full air purge to remove all the solvent.



Common Thermal Expansion Valve (TXV) systems will usually have a filter/drier located between the Condenser and the TXV and the debris is usually very limited from entering the Evaporator through the filter and TXV. However, in the case of a catastrophic Compressor failure, with nothing between the Evaporator outlet and the Compressor inlet, large debris does back up into the Evaporator when the system pressures equalize. This large debris cannot be flushed through the component and must be backed out the direction it came in. The TXV should be

removed and the component should be flushed through the smaller of the two ports (normal refrigerant flow direction). Monitor the recovery bucket for debris removal, stop flushing and clean as necessary, and repeat flushing if necessary; until out flow is showing clean. Follow up with the proper full air purge to remove all the solvent.

REAR AIR

For vehicles with rear air, the recommended procedure is to access the rear Evaporator and bypass the expansion device and flush the rear Evaporator. While disconnected from the front and rear, the long hoses can be connected together at one end and flushed like another component. Don't forget the proper air purge process.

TESTING FOR CLEANLINESS

Because so many variables exist, the following is recommended to test for cleanliness. It is known as the air "Pop" and considered by some to be "Old School", but it is what "Experienced" technicians do.

Using a high flow rubber tipped blow gun with nitrogen or very dry and filtered shop air, holding a clean lint cloth at the opposite port, blast the component hard with a generous volume. Because of the known effectiveness for the solvents to remove all the contaminant holding waste oils and sludge, any possible remaining debris particles are now loose and dry and will readily blow out.

Blow it in both directions and if nothing or a few very small specs are found in the lint cloth, this confirms the component is clean.

If a concerning amount of debris, oil, or solvent is blown out the technician at this point can blast more or repeat the flushing process to confirm their complete satisfaction in a clean and dry component.

ASSEMBLY AND PREPARATION FOR USE

WARNING: Always be sure all solvent and air pressure from previous use has been discharged before attempting to open the flush tank. Point the gun into the return bucket and pull the trigger until all pressure is dissipated then pull the ring on the safety pop off valve to be completely sure all residual pressure is gone.

FLUSHING FLUIDS

- It is highly recommended that you use HECAT SAFE-FLUSH.
- Chemicals found not to be compatible with Buna N [Nitrile] rubber should not be used. Non-approved flushes are Gasoline, Brake Fluid, Water, Acids, Corrosive liquids, foaming products, and known Ozone depleters.
- Flushing chemicals with heavy viscosity and a specific gravity number higher than 1 (water = 1) will not allow for the pulsating action to perform properly.

FLUSH TANK & PULSATING VALVE ASSY.

- The first fitting that is factory installed directly into the tapered threads on the top of the tank and should never be removed.
- Remove from the accessory bag and install the ¼ inch clear plastic pick up tube into the tubing "push to connect" fitting (green ring) on the bottom of the Pulsating Valve Assembly. Be sure to push the square cut end in firmly to bottom into the fitting, pull slightly to confirm proper installation.
- You can now fill with no more than 1 gallon of SAFE-FLUSH. Always use a flushing chemical suitable for the cleaning process you are attempting.
- Install the Pulsating Valve Assembly to the Flush Tank. Use no thread sealers on the swivel connection and only a light wrench tightening will be required to re-make the seal.

FLUSH GUN

- From the accessory bag, select and install the required tip for this particular flush job to the gun. The larger rubber tip is always recommended first, as it will allow for full flow. The extension wand and 45 degree adapter will aid in access to hard to reach ports but due to the force produced by this flusher, it may also make it difficult to keep the tip sealed. The small rubber tip should only be used with very small entry ports and will limit the flow rate and pulse of the flusher. Make sure the trigger safety lock is on.

RECOVERY BUCKET

- Using the fittings provided on the end of the return hose, connect the hose to your recovery bucket lid using the hole marked “return hose”. Place one washer on each side of the lid and point the 45-degree fitting in the direction of the arrow marked on the underside of the lid. The second hole is the air vent and should not be blocked at any time. Snap the lid on tight and connect the return hose to the component you are flushing.
- A rubber return adapter with clamp has been provided to offer some very limited assistance in making this very important connection to the component. Because of the infinite number of components this flusher can be used for it is up to the technician to select the most suitable method to make this connection. It is very important to securely fasten the return hose to the component in a manner that it will withstand the initial blast and pulsating action. The accidental release of this connection can be hazardous and messy.

USING THE PULSATOR FLUSH GUN

CAUTION: FOR FIRST TIME USE it is highly recommended you start with a lower pressure until you are completely comfortable and familiar with the hazards, spills, and mess involved with the use of this tool.

- Connect your filtered and dry shop air to the flush tank. **Air pressure regulator is preset at about 40-50 PSI.** There is a 100-PSI safety valve installed and it should never be disabled. After you have operated this tool and become familiar with its operation you can turn up the pressure to take full advantage of its maximum capability. No gauge is needed, just turn up the air holding a rag over the pop off until the pop off opens at 100 PSI and then back off the regulator ¼ turn. Max PSI is now set at approximately 90 PSI.
- **With proper personal safety equipment in place** and others clearly warned to stay away during this flush process, you can now unlock the trigger lock.
- Hold the rubber tip to the component **very firmly** and pull the trigger momentarily and release the trigger while maintaining a tight seal with the tip. **Note:** Due to the high volume blasting nature of this tool, after releasing the trigger, backpressure will temporarily exist and releasing the seal on the tip early will cause a spit back mess, allow a moment for this pressure to dissipate before carefully releasing the seal on the tip.
- **This first short blast is a test** to confirm you have selected a comfortable operating pressure, the correct tip, you are not seeing any hard blockage (spit back), and to test your return bucket connection. If any of these problems exist then a remedy to this problem should be employed before continuing.
- Holding the gun, again **very firmly** to the component, pull the trigger to begin the flush process. You will get an initial pressure blast and then the flusher will begin the pulsating scrubbing action. Be aware that the force required to hold and keep the tip sealed is directly related to the air pressure you have chosen. **Remember:** Failure to maintain adequate hand pressure on the Flush Gun during the flush process and for a short moment after releasing the trigger, because backpressure may exist, will cause a spit back hazard and mess.
- When using 1-gallon of flush you can back flush for 45 seconds and swap the recovery bucket to the other port and flush again for an additional 45 seconds. Or you can flush in one direction for 90 seconds. Note: The estimated flush time will vary with pressure and tip selections. The flushing path, selection of solvent, and number of flushes is completely at the discretion of the technician.

- When the flush has been used up you can now continue to hold the trigger to perform an air purge. Regardless of which direction you were flushing, it is recommended you always air purge top down, from highest port to lowest port. This will allow gravity to aid in the removal of all the residual flush. 5 minutes for oil coolers and 20-30 minutes for A/C components are suggested. For this longer A/C purge; connecting a direct dry (think paint booth dry) shop air line is an alternative to holding the gun for this time. Always follow the chemical manufacturer's recommendations for air purging the flushing chemical you have chosen to use. Remember: TEST FOR CLENLINESS.
- Flush job is completed and you can now disconnect the air supply line, a check valve will not allow for a rapid air release. Using the trigger you should carefully discharge the remaining air pressure into the recovery bucket. Lock the trigger and store the flusher in the recovery bucket ready for your next need.

WARRANTY STATEMENT

Please do not call the distributor you purchased this item from. Warranties are 100% the responsibility of, and handled directly by, the manufacturer. You should call Hecat's toll free number, which is **1-800-380-9501**. You must contact Hecat and obtain a return authorization number before returning any unit to the manufacturer.

HECAT, INC. offers to the user of the HECAT Pulsator Flush Gun a one-year limited warranty. This warranty covers all manufacturing defects in materials and workmanship for one year from the date of purchase and is offered only to the original purchaser. This warranty shall not apply to any flusher that has failed due to the failure to follow printed instructions, misuse, neglect, or accident. This warranty shall not apply to any flusher showing evidence of using a non-approved flush. Non-approved flushes are Gasoline, Brake Fluid, Water, Acids, Corrosive liquids, foaming products, and known Ozone depleters. This warranty shall not apply to any unit repaired by an unauthorized person or shows any evidence of corrosion due to the failure to properly use an in line air filter to supply filtered dry air to operate any flusher.

If returning to the factory is necessary, HECAT, INC. will evaluate warranty claim and then, if approved, repair or replace at its option any unit returned. Units for warranty evaluation must be shipped freight pre-paid to the manufacturer's designated address. A letter referencing the return authorization number, outlining the malfunction, proof of purchase with date purchased, and owner's name, address, and contact information must accompany any flusher returned.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the following statement may not apply in your state. Incidental or consequential damages occurring as a result of usage of this flusher are not covered by this manufacturer's warranty.

There are no other warranties implied or stated.