

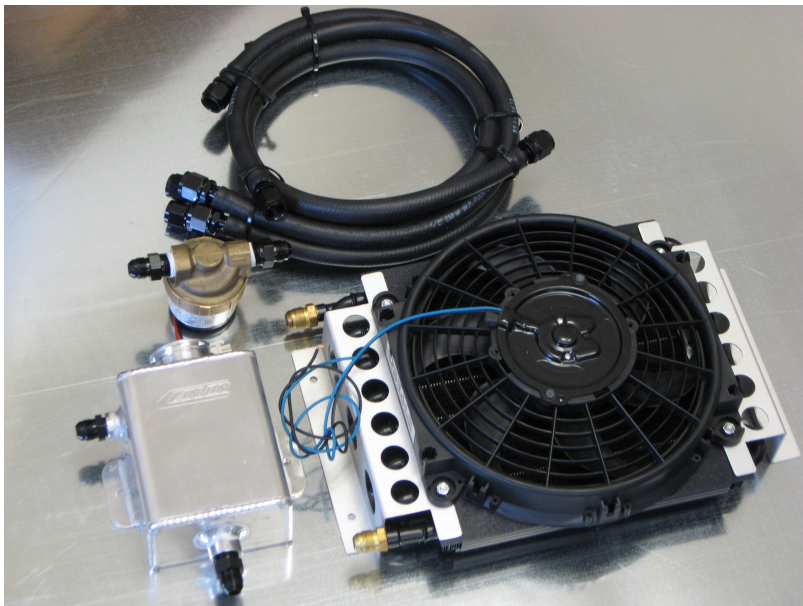
NetGain Controls, Inc.

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WarP-Drive™

Performance Liquid Cooling Kit

By: NetGain Controls, Inc.
Powering the future!



Installation Guide

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Introduction

Thank you for purchasing a NetGain Controls *WarP-Drive* Performance Liquid Cooling Kit. This set of components has been carefully chosen to provide you with practical, functional means of liquid cooling a WarP-Drive motor controller, or similar equipment. If installed properly, this kit should provide many years of cooling service. Please carefully read these instructions to ensure that everything is installed correctly.

Installation Overview

Estimated time: 2-4 hours to complete the installation.

1. Determine the location where the components will be installed. The proper locations will be discussed in more detail later.
2. Mount the individual components.
3. Connect the tubing between the components.
4. Fill the system with liquid and check for any leaks.
5. Power the pump and ensure flow through the system.
6. Top off the coolant and double-check that everything is secure.

Package Contents

When you open the package, verify that you received everything.

The package includes:

- Aluminum Reservoir
- Pump with pump leads and connectors
- Radiator assembly (includes fan)
- 3 -8 AN 1/2" NPT fittings (two for pump, one for bottom of reservoir)
- 1 -8 AN 3/8" NPT fitting for side of reservoir
- High quality -8 AN (1/2") tubing (10 feet)
- 4 -8 AN straight barbed fittings
- 4 -8 AN 90 degree barbed fittings

Tools Required

The following tools might be required for the installation:

- Phillips screwdriver
- Wire strippers

- Connector crimpers

In addition, it is suggested that a relay (not included) be used to turn on the pump and fans. Turning the fan and/or pump on directly with switches that aren't rated for their currents can lead to problems.

Layout

Plan the layout of each component in the kit. The reservoir should be mounted at the highest “elevation” in the cooling loop. The other items in the kit can be at whatever position lower than the reservoir that is most convenient. In general, placing the pump at the lowest point in the system will make purging easier. Also, placing the pump close to the reservoir will help in priming the pump. Try to keep all of the components as close together as possible. Adding more hose than what comes in the kit will reduce flow rate and consequently decrease cooling performance. Conversely, using less tubing than what ships with the kit will increase performance of the system.

Even though the pump has been potted to protect against damage from moisture, it should be placed in a location that is as free from water and moisture as possible. Try to locate the components in a way that will not cause sharp bends in the tubing.

Choose a location for the radiator that allows air to circulate around it. Placing it in direct airflow from the movement of the vehicle will aid in cooling.

Mounting and Installation

The component that requires the most real-estate under the hood is the radiator assembly. It's convenient mounting feet simplify the installation process. Place the radiator in a location that can get adequate circulation around it.

The fan can be switched on/off using a relay. The fan can be turned on with the same relay that is used to turn on the pump.

The pump can be installed in just about any orientation. The only orientation that should be avoided is to have the outlet facing downwards.

Preparing and Connecting Tubing

With the reservoir, radiator, and pump securely mounted, the tubing can be connected to each of the devices.

The suggested routing is as follows:

1. Reservoir
2. Pump inlet
3. Pump outlet
4. WarP-Drive controller (or device to be cooled)

5. Radiator

As was mentioned previously, placing the pump lower than the reservoir will prevent problems priming the pump.

Four 90 degree barbed fittings and four straight fittings are provided. Use the 90 degree fittings to reduce bends in the tubing as much as possible.

To install the barbed fittings in the tubing, following these steps:

1. The next steps can benefit by fixing the tubing in a vise. Do not tighten excessively on it but enough to hold it tight. It is not absolutely necessary to use a vise but it greatly simplifies the process.
2. Heat the tubing end that the fitting will be installed in. The recommended method to heat the tubing is with a high-output heat gun. Do not heat the tubing to the point where it begins to melt or deform. The next steps should be performed quickly before the tubing begins to cool down.
3. Apply a very small amount of motor oil (just a small drop) to the barbs of the fitting and rub it around the barbs with your finger or a towel. The barbs should not be dripping in oil – just a very light coating.
4. In one stroke push the fitting into the tubing.

Repeat the above step for each section of hose. Once the tubing sections have all been prepared install each section to its corresponding component. When tightening the AN fittings, be careful to tighten sufficiently but do not apply excessive force.

Filling With Coolant

Once the tubing has been routed and the connections are secure, the system can be filled with coolant. Any high-quality automotive anti-freeze will work fine. The lower the concentration of coolant to water, the better the system performance will be. However, ensure that the mixture is correct to prevent freezing for your environment. The coolant temperature should not be allowed to exceed 170F. As long as that constraint is met, boiling of the coolant is not a concern.

Slowly fill the system through the reservoir. Check for leaks and adjust connections if needed. Fill the system until the reservoir coolant level is just below the inlet fitting (in the final step, it can be filled above this). **Do not turn on the pump as it has not been primed with liquid!**

The easiest way to get the pump primed is to follow the previous instructions for mounting the pump below the reservoir. As you fill the reservoir with liquid, it will naturally flow into the pump. When you see the fluid level in the reservoir dropping and a quantity of fluid has been introduced, you know that the pump has been sufficiently primed. At this point, you can turn the pump on. Liquid should quickly fill the entire system and fluid start to flow back into the return (upper) port of the reservoir. Verify that there is sufficient coolant in the reservoir. When the pump is powered, coolant should begin to immediately flow. If this is not the case, ensure that coolant has flowed from the reservoir to the pump, and that the reservoir is at least half full. When the coolant is flowing at full force (about 1.5 GPM) the liquid will have enough momentum to almost strike the opposite inside wall of the reservoir

Final Steps

The tubing can now be secured (if desired) to the chassis. Verify that the pump turns on when desired. If the previous suggestion of leaving the coolant below the inlet of the reservoir was followed, you can watch the flow through the inlet to ensure that the coolant is flowing properly. Watching the flow through the reservoir inlet can give assurance that things are working properly. Once this has been done, it is acceptable to fill the reservoir to just above the reservoir inlet.

Maintenance Procedures

It is recommended that the coolant level be checked regularly. The coolant can go long periods of time without being changed.

Physical Specifications

Package Weight:	13 lb, 8 oz
Package Dimensions:	22" x 14" x 6"

Electrical Specifications

Pump Voltage:	8-24V
Pump Current:	1.9A (peak)
Pump Watts:	3-33W
Fan Voltage:	0-15V
Fan Current:	4.5A at 12V