

# **H2O-80 MICRO LIQUID COOLING KIT**

## **TUTORIAL & INSTALLATION GUIDE**

**Water  
cooling  
Swifttech**  
*manufacturer of the world's best active coolers*

These instructions are updated on a regular basis. Please visit our web site at  
<http://www.swiftnets.com>

## Packing List

<b>QTY</b>	<b>ITEM</b>
<b>1</b>	APOGEE water-block, including hold-down plates (multi sockets and AM2), various processors mounting systems, and (2) hose clamps
<b>1</b>	MCP350 pump, including mounting hardware and (2) 3/8" hose clamps
<b>1</b>	MCRES-Micro, including mounting hardware, 3/8" hose-barb fittings, and (2) hose clamps
<b>1</b>	MCR80-QP Radiator assembly, including pre-installed 80mm fan (without fan guards), mounting hardware, 12v to 7v adapter, and (2) hose clamps
<b>8</b>	Feet 3/8" ID industrial grade PVC tubing
<b>1</b>	Length (40") Smartcoils 500 clear
<b>1</b>	2 Oz. Bottle of HydrX concentrated coolant
<b>1</b>	Syringe of Arctic Céramique thermal compound

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## INTRODUCTION

*Congratulations on your purchase of a Swiftech™ H2O-APEX liquid cooling system!*

*This kit has been designed to facilitate the installation of the components with a minimum or no of case modifications. While all attempts have been made to make the installation of this system user friendly, please note that this system is intended for users that are well versed in installing computer components.*

### DISCLAIMER

While all efforts have been made to provide the most comprehensive tutorial possible, Swiftech assumes no liability expressed or implied for any damage(s) occurring to your components as a result of using Swiftech cooling products, either due to mistake or omission on our part in the above instructions, or due to failure or defect in the Swiftech™ cooling products.

In addition, Swiftech assumes no liability, expressed or implied, for the use of this product, and more specifically for any, and all damages caused by the use of this product to any other device in a personal computer, whether due to product failure, leak, electrical short, and or electro-magnetic emissions.

### WARRANTY

Our products are guaranteed for 12 months from the date of delivery to the final user against defects in materials or workmanship. During this period, they will be repaired or have parts replaced provided that: (I) the product is returned to the agent from which it was purchased; (II) the product has been purchased by the end user and not used for hire purposes; (III) the product has not been misused, handled carelessly, or other than in accordance with any instructions provided with respect to its use. This guarantee does not confer rights other than those expressly set out above and does not cover any claims for consequential loss or damage. This guarantee is offered as an extra benefit and does not affect your statutory rights as a consumer.

## I. Planning

### 1. GENERAL GUIDELINES

- ☐ Please read this guide carefully and entirely before you start this installation. Plan your installation ahead. Observe the relative position of the components for possible interference with other components.
- ☐ Never work with electricity connected to the computer while work is in progress.
- ☐ Because some work is necessary that will require cutting holes in the case, it is strongly recommended to remove all the components from the case prior to begin with this installation.
- ☐ After the metal work has been completed, carefully clean the case to remove all metal debris.
- ☐ Once the time has come to re-install the motherboard and complete the liquid-cooling circuit, the motherboard should be disconnected from the power-supply at all times during the entire mock-up phase of the installation. In case of a spill or leak on the motherboard, do not panic! As long as the motherboard is not electrically connected, no harm is done. You must however thoroughly dry the exposed area, using a hair dryer for example, and wait a minimum of 6 to 8 hours prior to re-connecting the motherboard to its power source.
- ☐ The reservoir should preferably be installed at the highest point of the cooling circuit (top 5 ¼" tray), although this is not absolutely necessary if all the other components are self-purging.
- ☐ Think about the airflow inside your chassis. In liquid-cooling environments, it is always better to draw fresh air from the outside through the radiator, as opposed to using the warm air from inside the computer.
- ☐ Make sure to dry-fit all components before making final connections and filling the water-cooling system.

### 2. TUBE ROUTING

- ☐ The tubing for the water-cooling system must be routed to form a complete loop that includes all elements of the system. When daisy-chaining components, the simplest and most natural route is usually the best. Always avoid sharp bends that would kink the tubing!

- ☐ The following table contains examples on how to establish connections between the different elements of a cooling circuit based on multiple possible configurations. These are guidelines only, and may change depending on the relative position of the components inside your chassis.
- ☐ From a performance standpoint there is very little performance to be gained from strictly controlling the component sequence: the maximum delta T (difference in temperature) between any two points of the liquid cooling circuit does not exceed 1°C. Whenever possible, performance oriented users will typically want to route the radiator discharge(s) tube(s) to the inlet of the CPU cooler, since the fluid exiting the radiators is always the coolest.

<b>Devices:</b>	<input type="checkbox"/> <b>(1) CPU cooler + (1) Radiator + Pump-reservoir assembly</b>
Connect:	<input type="checkbox"/> Pump discharge to radiator inlet <input type="checkbox"/> Radiator discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
Alternatively, Connect:	<input type="checkbox"/> Pump discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to radiator inlet <input type="checkbox"/> Radiator discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
<b>Devices:</b>	<input type="checkbox"/> <b>(1) CPU cooler + (1) VGA cooler + (1) Radiator + Pump-reservoir assembly</b>
Connect:	<input type="checkbox"/> Pump discharge to VGA Cooler inlet <input type="checkbox"/> VGA cooler discharge to radiator inlet <input type="checkbox"/> Radiator discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
Alternatively, Connect:	<input type="checkbox"/> Pump discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to VGA cooler inlet <input type="checkbox"/> VGA cooler discharge to radiator inlet <input type="checkbox"/> Radiator discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
<b>Devices:</b>	<input type="checkbox"/> <b>(1) CPU cooler + (1) VGA Cooler + (1) chipset Cooler + (1) Radiator + Pump-reservoir assembly</b>
Connect:	<input type="checkbox"/> Pump discharge to chipset cooler inlet <input type="checkbox"/> Chipset cooler discharge to VGA cooler inlet <input type="checkbox"/> VGA cooler discharge to radiator inlet <input type="checkbox"/> Radiator discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
Alternatively, Connect:	<input type="checkbox"/> Pump discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to chipset cooler inlet <input type="checkbox"/> Chipset cooler discharge to VGA cooler inlet <input type="checkbox"/> VGA cooler discharge to radiator inlet <input type="checkbox"/> Radiator discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!
<b>Devices:</b>	<input type="checkbox"/> <b>Dual CPU cooler and VGA cooler (SLI) configurations</b>
Connect:	<input type="checkbox"/> CPU coolers in series: CPU cooler (1) discharge to CPU cooler (2) inlet <input type="checkbox"/> VGA coolers in series: VGA cooler (1) discharge to VGA cooler (2) inlet
<b>Devices:</b>	<input type="checkbox"/> <b>Dual Radiators: A second radiator can be added anywhere in the loop in series with the other components, for example</b>
Connect:	<input type="checkbox"/> Pump discharge to radiator (1) inlet <input type="checkbox"/> Radiator (1) discharge to VGA cooler inlet <input type="checkbox"/> VGA Cooler discharge to chipset cooler inlet <input type="checkbox"/> Chipset cooler discharge to radiator (2) inlet <input type="checkbox"/> Radiator (2) discharge to CPU cooler inlet <input type="checkbox"/> CPU cooler discharge to reservoir inlet <input type="checkbox"/> Reservoir discharge to pump inlet – MANDATORY!

## II. Installation of the cooling components

**Warning!** Placement of the cooling components may vary depending on your chassis and motherboard configurations. A mock-up installation is thus necessary to estimate the length of the different sections of tubing that will be required between each component.

The following is the recommended sequence of components installation.

1. Radiator and fan
2. Water-block(s)

3. Pump
4. Reservoir

## 1. RADIATOR INSTALLATION

The MCR80-QP Radiator ships pre-assembled with our 80mm fan, as shown in figure 1. All you need to do is re-use the existing fan screws, or fan retention mechanism.

An alternate installation is also possible as shown in figure 2, by using the provided M3.5mm x 30mm screws, going through the computer panel, through the fan, and to the radiator.

### ❑ Installation to the back of the computer:

If CPU cooling is a priority, we suggest that the fan be installed in intake mode in contradiction to the "classic" airflow scheme, which is intake at the front, and exhaust at the back. As shipped the fan is therefore pre-installed by default in intake mode, so that fresh air will be circulating through the radiator and optimize the CPU temperature. In effect, if the fan flow direction were reversed the radiator would be cooled with heated air from inside of the computer, which is usually 3°C (at best) and up to 10°C hotter than that of the ambient air outside of the computer. Conversely, users with excellent ventilation in their case may opt to install the fan in exhaust mode with the understanding of the above stated temperature handicap.

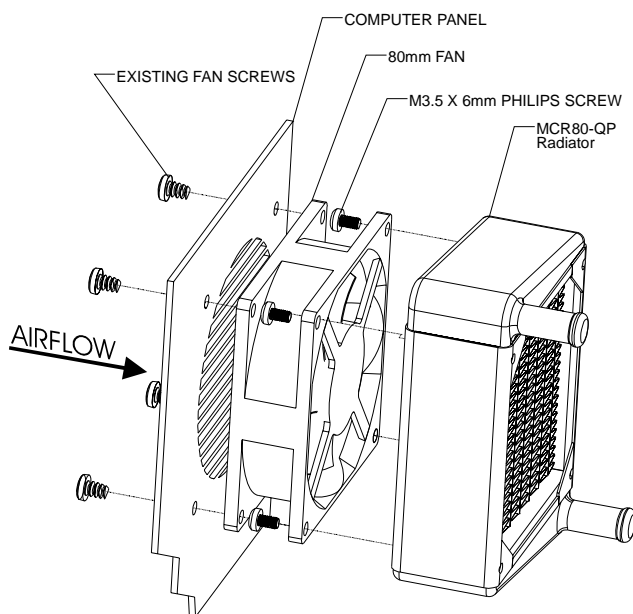


Figure 1

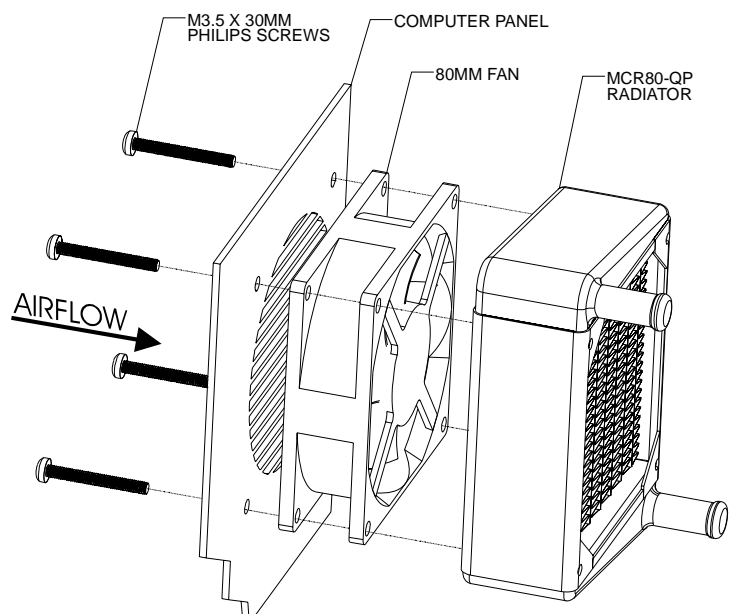


Figure 2

### ❑ Installation to the front of the computer

Simply bolt the fan to the chassis as indicated above.

### ❑ Electrical connections

The fan shipped with the MCR80-QP radiator uses a 3-pin connector. For 12volt operations, this connector can be safely installed on one of the motherboard headers. Use any free header **other than** the CPU fan header, since the pump RPM sensor will be connected to the CPU fan header in order to monitor the pump.

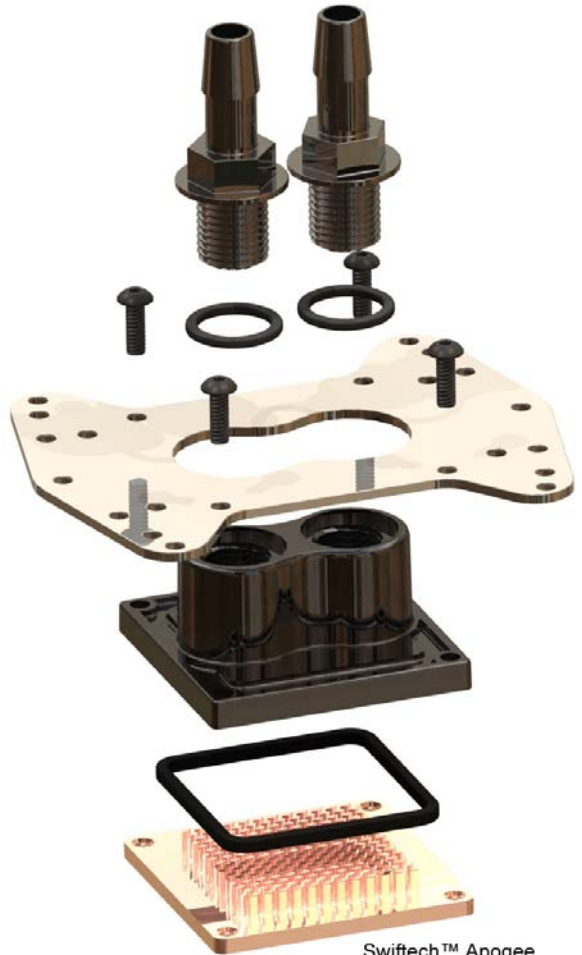
For low noise operations, an additional fan connector adapter is supplied with the kit, and should be connected to the power supply instead of a motherboard fan header:

- ❑ 12v to 7v adapter: this setting provides a good balance for performance, at whisper quiet operations.
- ❑ Please consult the product page ([www.swiftnets.com/products/h20-80-micro.asp](http://www.swiftnets.com/products/h20-80-micro.asp)) on our web site for specific data with respect to CPU temperatures when using the 12 to 7V adapters.

Once the radiator is fastened to the case, proceed with the next step, water-block installation. Tubing will be installed later on, once all the other components are in place.

**One or more Patents pending**

This product is intended for expert users. Please consult with a qualified technician for installation. Improper installation may result in damage to your components. Swiftech™ assumes no liability whatsoever, expressed or implied, for the use of these products, nor their installation. The following instructions are subject to change without notice. Please visit our web site at [www.swiftnets.com](http://www.swiftnets.com) for updates.



Swiftech™ Apogee  
One or more Patents Pending

**Figure 3 – Exploded View**

**Processor compatibility****Intel®**

- ☐ Pentium® 4, D, Celeron
  - Socket 478
  - Socket 775
- ☐ Xeon™ (socket 603 and 604)
  - 400 & 533 MHz FSB
  - 800 MHz FSB (Nocona)

**AMD®**

- ☐ Athlon XP, MP, Duron, Sempron, socket 462
- ☐ Athlon 64, Sempron, Socket 754
- ☐ Opteron, socket 939, 940



### Packing List

COMPONENT ID	COMPONENT DESCRIPTION	QTY	USAGE
BHSC006C0-007SS	6-32 X 7/16 BUT HD CAP SS	4.00	WATER-BLOCK ASSEMBLY
O-RING 3/32	B1000-133 O-RING 3/32 X 1 13/1	1.00	WATER-BLOCK ASSEMBLY
APOGEE-H	APOGEE WATERBLOCK HOUSING	1.00	WATER-BLOCK ASSEMBLY
APOGEE-BRKT	APOGEE HOLD-DOWN PLATE	1.00	WATER-BLOCK ASSEMBLY
APOGEE-BP	APOGEE BASE PLATE	1.00	WATER-BLOCK ASSEMBLY
B1000-2.5X50	BUNA-N 70D BLACK O-RING	2.00	FITTINGS
PM4S-6BN	1/4" - 1/8 NPSM TO 3/8" ID	2.00	FITTINGS
PM4S-8BN	1/4" - 1/8 NPSM TO 1/2 ID	2.00	FITTINGS
22HC04688	15/32" HOSE CLAMP	2.00	FITTINGS
22HC0672B	43/64" PREMIUM HOSE CLAMP	2.00	FITTINGS
SPRING6	SPRING FOR MCW6000-775	4.00	COMMON HARDWARE
6-32 HEX CAP	6-32 ACRON NUT	4.00	COMMON HARDWARE
12SWS0444	NYLON SHOULDER WASHER	8.00	COMMON HARDWARE
LOCKWASHER6	LOCK WASHER #6	6.00	COMMON HARDWARE
FW140X250X0215FB BLK	BLACK FIBER WASHER .140X.250X.	10.00	COMMON HARDWARE
632.112PHPMS	6X32 X 1 1/2 PHILIPS PAN HEAD	4.00	COMMON HARDWARE
6-32 NUT	6-32 NUT	4.00	COMMON HARDWARE
6-32 X 1 5/8	6-32 X 1 5/8	4.00	XEON SCREWS
WASHER-0148X0266X0040-91007A619	LOCK WASHER #6 X 0.040	4.00	AMD SOCKET 754/939/940,AM2 HARDWARE
90272A153-6-32X1.00-PHILIPS SCREW	6-32 X 1" PHILIPS SCREW	4.00	AMD SOCKET 754/939/940, AM2 HARDWARE
13RS040637	ROUND SPACER	4.00	AMD SOCKET 754/939/940,AM2 HARDWARE
APOGEE-AM2-BP	APOGEE AM2 BASE PLATE	1.00	AMD SOCKET AM2 HARDWARE
ARCTIC CÉRAMIQUE	ARCTIC CÉRAMIQUE	1.00	THERMAL COMPOUND

### Common installation guidelines

- ☐ Removal of the motherboard is necessary to install the mounting posts in all cases, except for AMD® socket 754, 939, 940 and AM2.
- ☐ The Apogee water-block may be installed in any direction. Simply rotate the water-block in your hand prior to fasten it to the processor when you are filling up the circuit. This will purge it from any air bubbles.
- ☐ The inlet and outlet are interchangeable with respect to flow direction.
- ☐ Coolant: use of distilled water is mandatory. Swiftech's HydrX coolant is recommended as an antifungal, and corrosion inhibitor.

#### **1. Step-by step**

- ☐ Install the fittings with their o-rings into the water block. Tighten each fitting until the flange of the fitting mates with the ledge of the water-block, then lock it by adding ¼ to ½ turn.
- ☐ Remove the existing heat sink from your motherboard.
- ☐ Apply the provided Arctic C  ramique thermal compound to the CPU following the comprehensive installation instructions provided here: [http://www.arcticsilver.com/ceramique\\_instructions.htm](http://www.arcticsilver.com/ceramique_instructions.htm)
- ☐ Install the Apogee water-block following the individual installation schematics for each type of CPU socket provided hereafter.
- ☐ Connect the tubing to the water-block hose-barbs. Use the provided hose-clamps to secure the tubing to the barbs.

#### **2. Individual installation schematics**

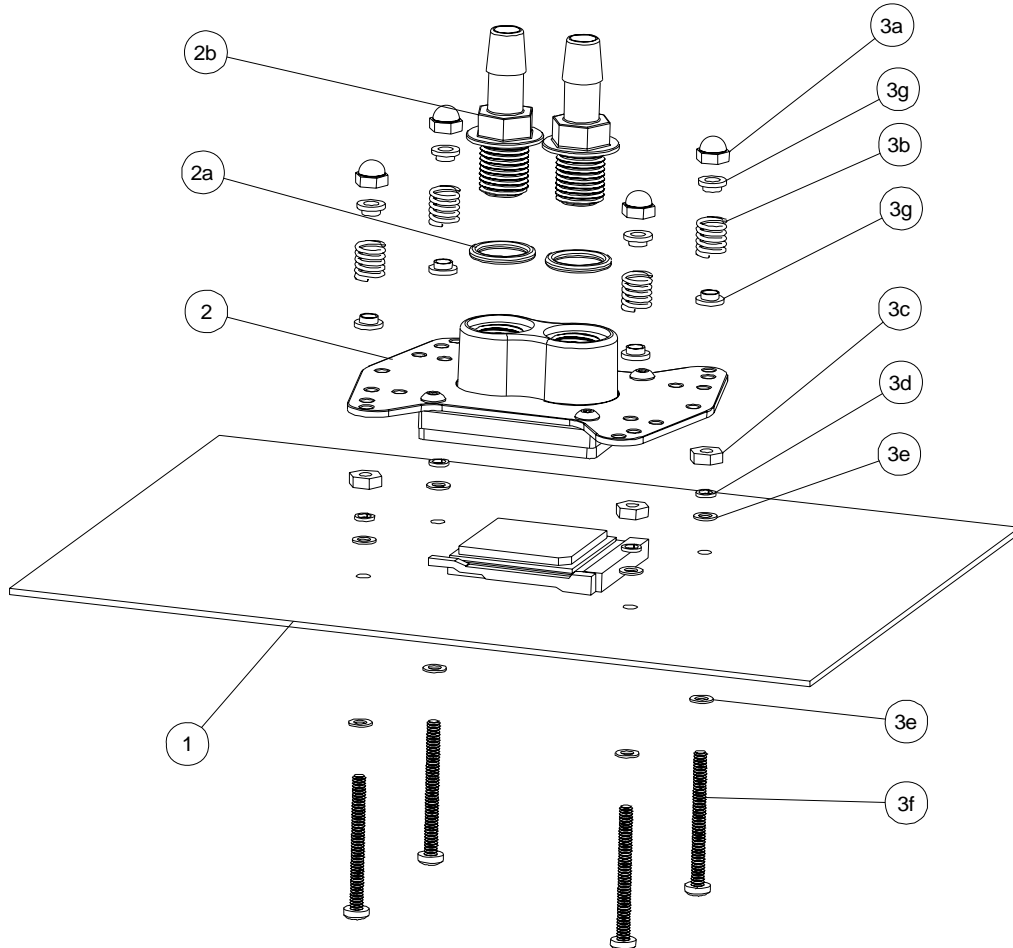
The provided mounting hardware is common to Intel® Pentium® 4 socket 478, socket LGA775, and AMD® socket 462. AMD® socket 754, 939, 940 and AM2 mounting hardware is identified in a separate pack, as well as Intel® Xeon hardware.



# Intel® Pentium® 4 Socket 478

Use hardware from the “common pack”

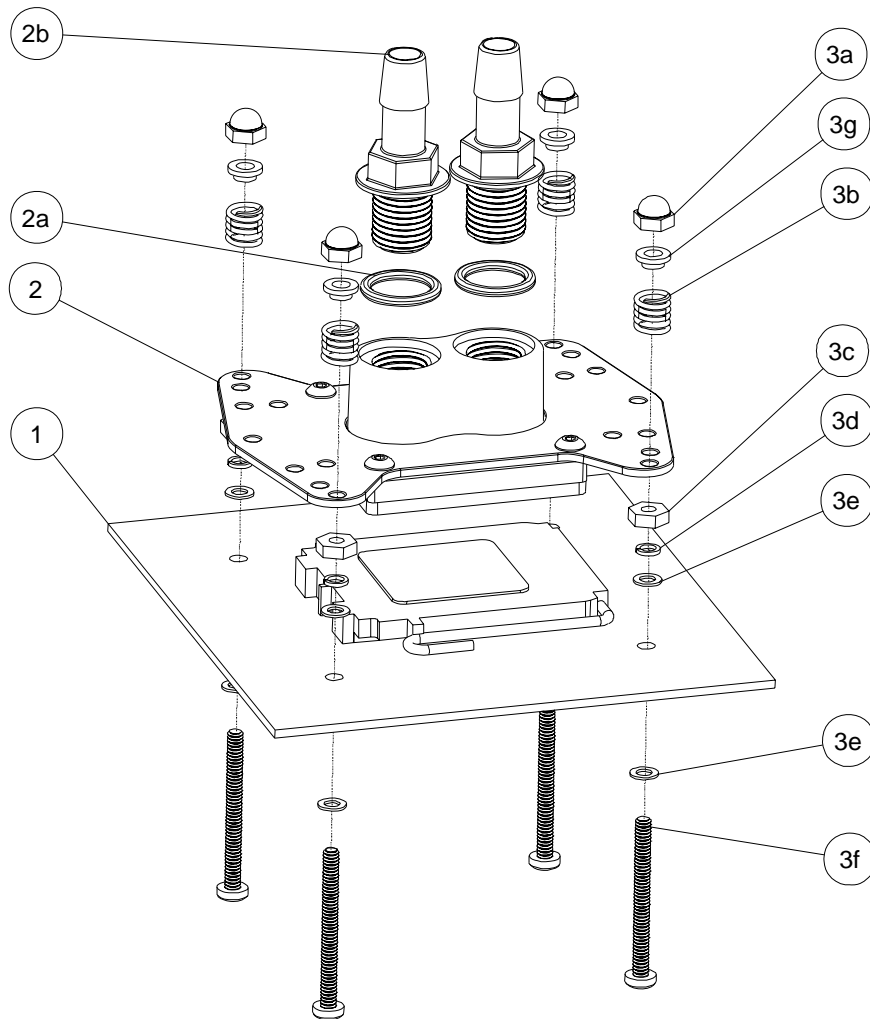
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	S478	Intel Pentium 4 socket 478 motherboard and processor	1
2	apogee-assy		1
	APOGEE-H	Housing	1
	APOGEE-BP	Base Plate	1
	APOGEE-BRCKT	Universal hold-down plate	1
2a	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2
2b	1-4-straightx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2
3	APOGEE-P4S478--HARDWARE		4 x
3a	6-32-Acorn-nut	6-32 Acorn nut	1
3b	70927-368	Spring	1
3c	6-32-nut	6-32 nut	1
3d	LOCK-WASHER#6	#6 lock washer	1
3e	FW140X250X0215FB BLK	black fiber washer	2
3f	91772A157-6-32x1.5	6-32 x 1 1/2" philips screw	1
3g	12SWS0444	NYLON SHOULDER WASHER	2



## Intel® Pentium® 4 and Pentium® D Socket LGA 775

Use hardware from the “common pack”

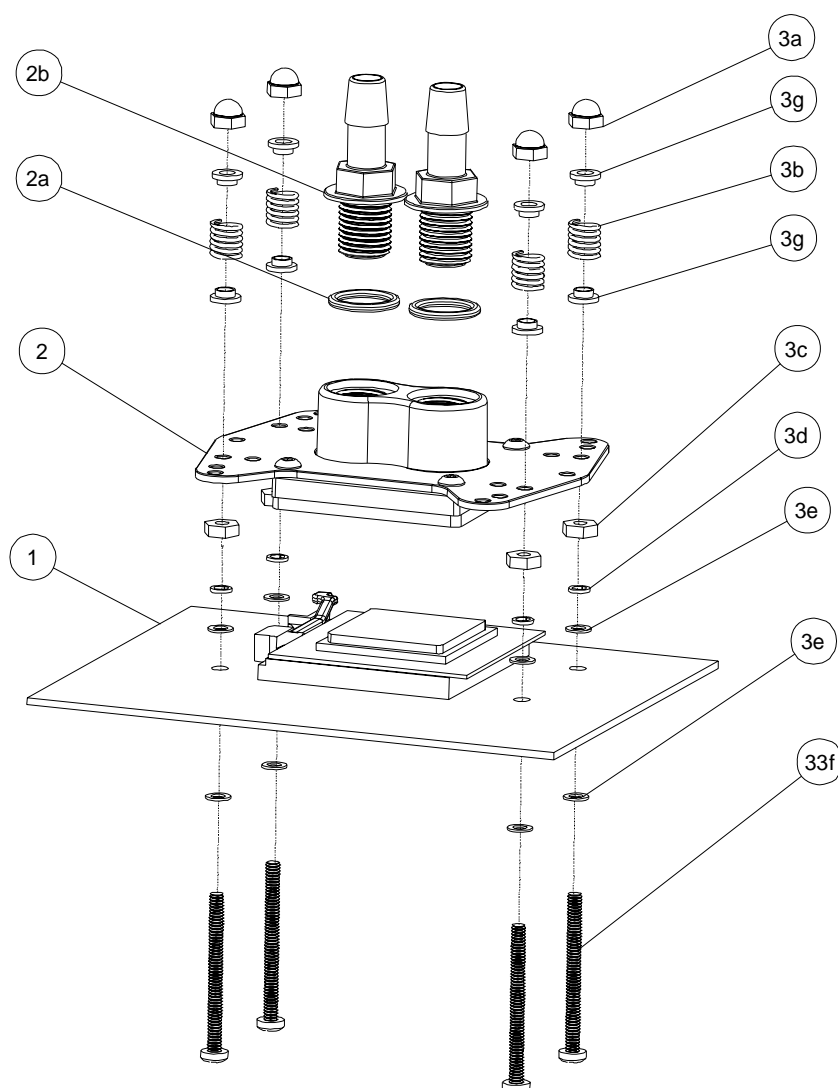
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	LPGA 775	Motherboard	1
2	apogee-assy		1
	92949A149		4
	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2
2a	1-4-straightx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2
2b	O-RING_3-32	B1000-133 O-RING 3/32 X 1 13/1	1
	APOGEE-H	Housing	1
	APOGEE-BP	Base Plate	1
	APOGEE-BRCKT	Universal hold-down plate	1
3	APOGEE-775-HARDWARE		4 x
3a	6-32-Acorn-nut	Acorn nut	1
3b	SPRING6	spring	1
3c	6-32-nut	6-32 nut	1
3d	LOCK-WASHER#6	Lock washer	1
3e	FW140X250X0215FB BLK	black fiber washer	2
3f	91772A157-6-32x1.5	Philips screw 6-32 x 1 1/2	1
3g	12SWS0444	NYLON SHOULDER WASHER	1



## Intel® Xeon™ Socket 603/604 400 and 533 MHz FSB motherboards

Use all parts from “common parts pack” except Philips screws: replace with the enclosed 6-32 1 5/8” long screws, instead of the 1 1/2” long screws supplied in the common parts pack.

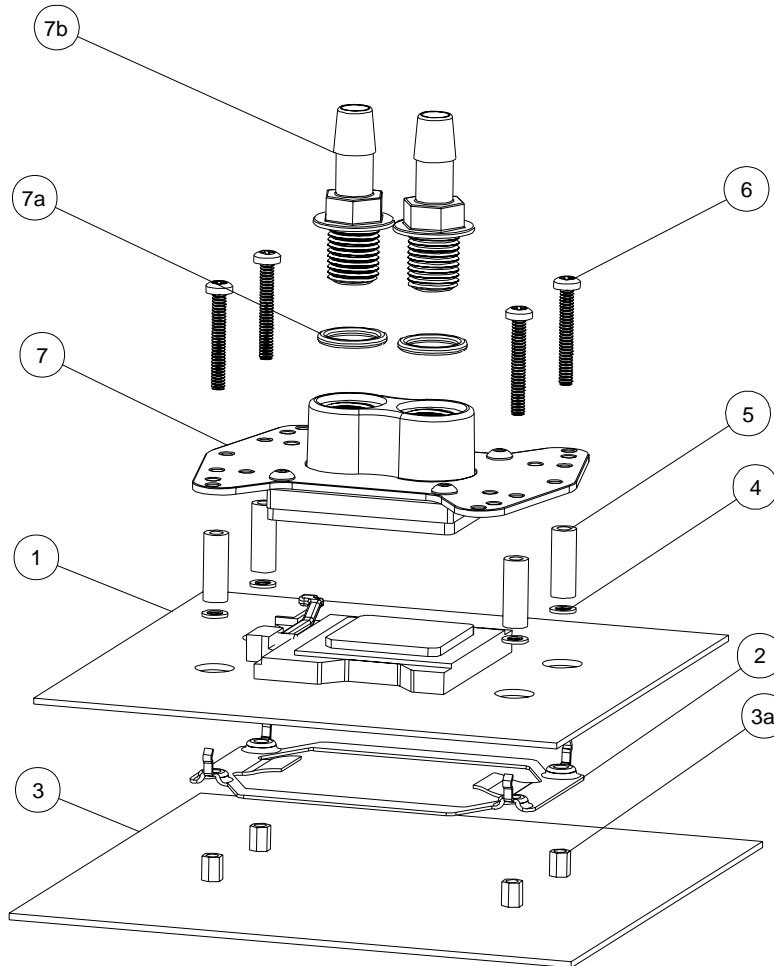
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Socket-603-604	Motherboard	1
2	apogee-assy		1
	APOGEE-H	Housing	1
	APOGEE-BP	Base Plate	1
	APOGEE-BRCKT	Universal hold-down plate	1
2a	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2
2b	1-4-straightx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2
3	APOGEE-XEON-HARDWARE		4 x
3a	6-32-Acorn-nut	6-32 Acorn nut	1
3b	SPRING6	Spring	1
3c	6-32-nut	6-32 nut	1
3d	LOCK-WASHER#6	#6 lock washer	1
3e	FW140X250X0215FB BLK	black fiber washer	2
3f	6-32X1.5-8	6-32 x 1 5/8" philips screw	1
3g	12SWS0444	NYLON SHOULDER WASHER	2



## Intel® Xeon™ Socket 604 “Nocona” 800 MHz FSB motherboards

**Use Intel Xeon “Nocona” separate hardware.**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Nocona board mockup	Motherboard	1
2	spring-backplate	retention spring (provided by motherboard vendors)	1
3	chassis		1
	3a	STANDOFF-0.187	4
4	4-40 nylon retaining washer	4-40 nylon retaining washer	4
5	SPACER-13LTS2501400697	Apogee - Nocona nylon spacer	4
6	90272A153-6-32x1-philips	6-32 x 1" Philips zinc plated screw	4
7	apogee-assy		1
	APOGEE-H	Housing	1
	APOGEE-BP	Base Plate	1
	APOGEE-BRCKT	Universal hold-down plate	1
7a	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2
7b	1-4-straightx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2



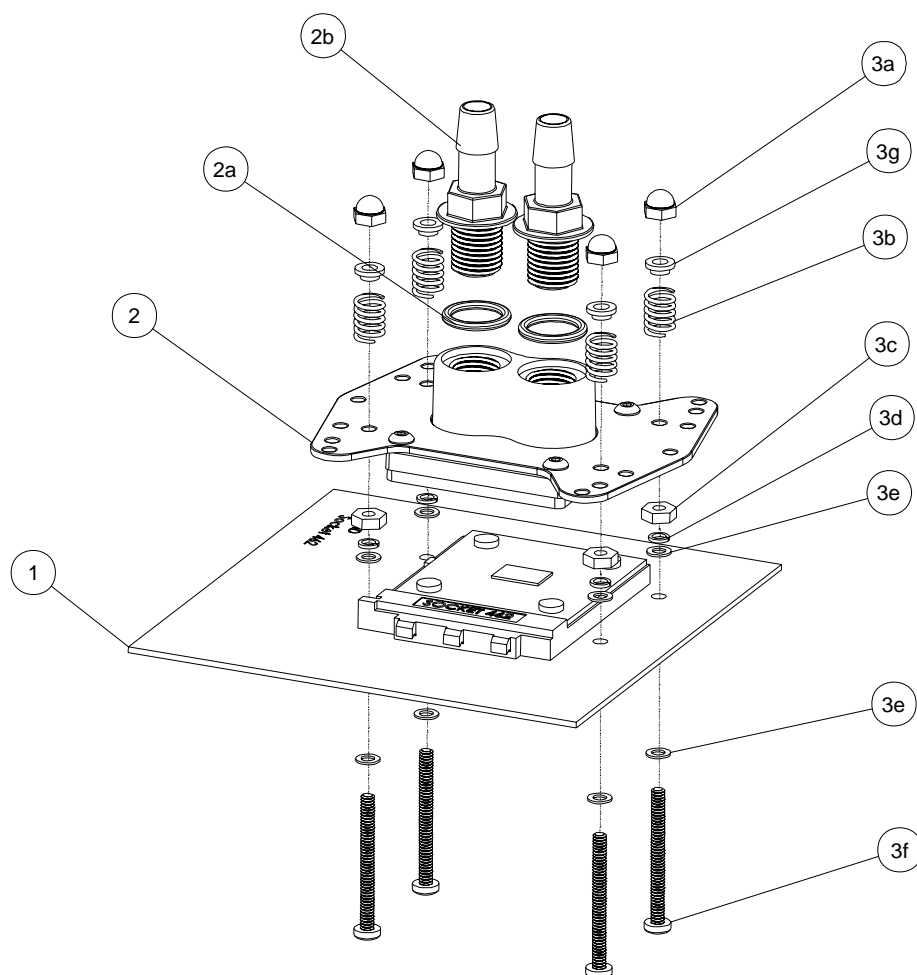
Note to dual processor users: since the Apex Ultra is provided with one Waterblock only, you will need to procure another Apogee Waterblock separately for your second. Please note that the “Nocona” hardware is not included with the Apogee Waterblock, and also needs to be procured separately under part number: AP-NC604 (\$3.00)

# AMD® Athlon®, Duron®, MP, XP, Sempron® Socket 462

Use common hardware pack.

**Compatibility:** Exclusively compatible with motherboards featuring mounting holes around the socket.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	socket462	Motherboard and CPU assy.	1
2	apogee-assy	Waterblock	1
	92949A149	6-32 X 3/8" PHILIPS	4
2a	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2
2b	1-4-straightx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2
	APOGEE-H	Housing	1
	APOGEE-BP	Base Plate	1
	APOGEE-BRCKT	Universal hold-down plate	1
3	APOGEE-462-HARDWARE		4 x
3a	6-32-Acorn-nut	Acorn n ut	1
3b	SPRING6	Spring	1
3c	6-32-nut	Hex Nut	1
3d	LOCK-WASHER#6	Lock washer	1
3e	FW140X250X0215FB BLK	Ffiber washer	2
3f	91772A157-6-32x1.5	6-32 x 1 1/2 philips screw	1
3g	12SWS0444	Nylon shoulder washer	1

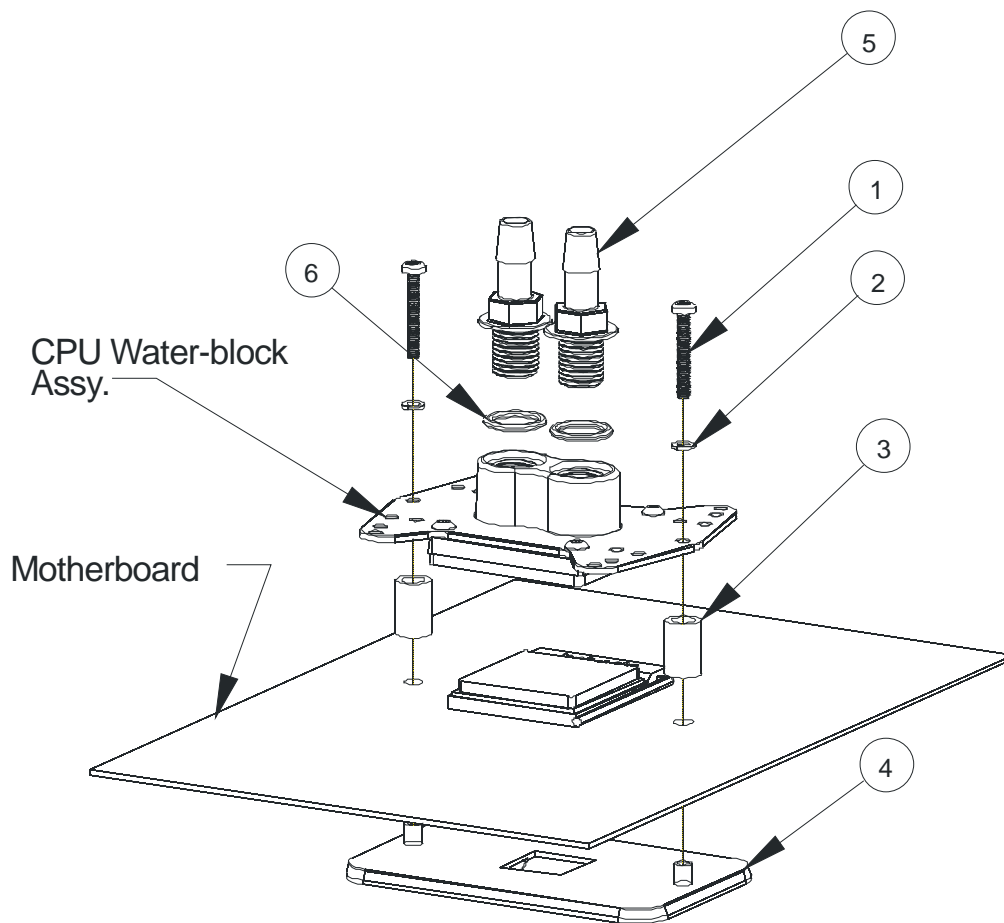


"An additional part is available in order to work with motherboards with high density of capacitors around the socket".  
Article # AP-S462-R

## AMD® 64, Sempron®, Opteron® Socket 754, 939, 940

**Use separate AMD 754/939/940 hardware pack**

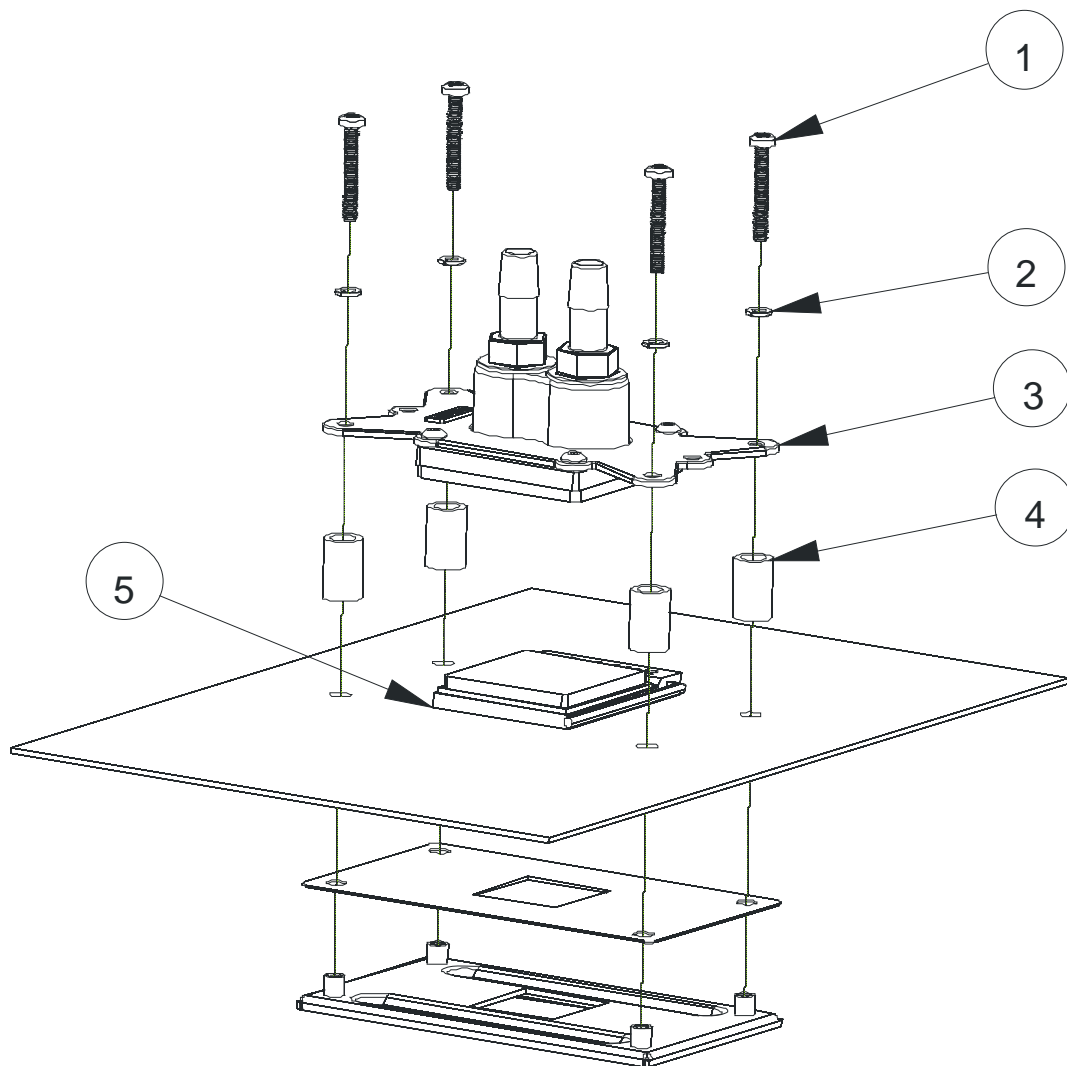
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	90272A153-6-32x1.00-philips	6-32 x 1" Philips screw	2
2	washer-0148x0266x0040-91007A619	Lock Washer #6 x 0.040	2
3	13RS040637	Nylon spacer for Apogee K8 assy	2
4	AJ00264	Motherboard Back plate (not provided)	1
5	1-4-NPSMx3-8-barb	1/4" NPSM X 3/8" Barb fitting	2
6	O-RING-9557K473	1-4" NPSM barb fitting O-Ring	2



## AMD® 64, FX, X2, Sempron®, Socket AM2

Remove the pre-installed hold-down plate first, as described on the next page.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	90272A153-6-32x1.00-philips	Philips screw	4
2	washer-0148x0266x0040-91007A619	Lock Washer #6 x 0.040	4
3	apogee-assy-AM2		1
4	13RS040637	Nylon spacer for Apogee K8 assy	4
5	SOCKET AM2		1

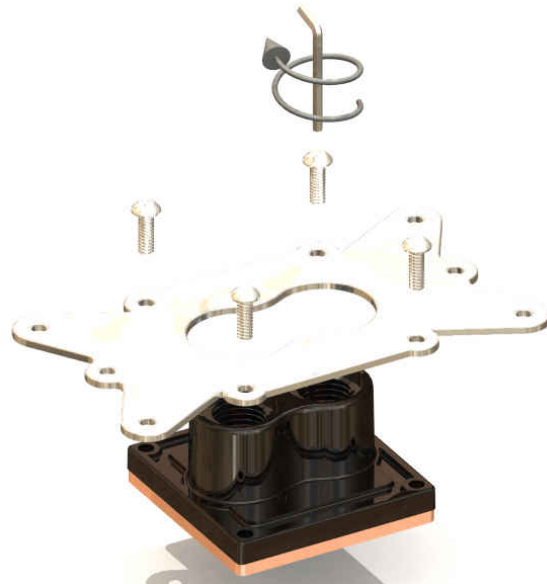




The Apogee water-block ships pre-installed with the multi-socket hold-down plate. In order to install your Apogee with AMD's AM2 socket, you will need to remove the existing hold-down plate and replace it with the AM2 model as follows:



Step 1: loosen all 4 screws using the included hex key, and set aside the standard hold-down plate.



Step 2: place the AM2 hold-down plate on the Apogee body, and fasten all four screws in cross pattern.

You can now use your Apogee with AM2 socket. Please read the common and step by step installation guidelines in page 2 to proceed with the installation of the product.

### 3. RE-INSTALLING THE MOTHERBOARD

Now that the APOGEE water-block is securely fastened to the motherboard, go-ahead and install the motherboard into the chassis, following the instructions provided in your motherboard installation guide.

### 4. PUMP INSTALLATION

#### □ General Use

The MCP350™ pump is a magnetically driven centrifugal pump featuring a 12 V DC brushless motor. It requires no maintenance when used with de-mineralized water and the appropriate anti-fungal additives. The pump connects directly to your computer power supply using the standard Molex 4 pin connectors. The pump also features a second wire equipped with a 3-pin connector designed to connect to a motherboard fan header, and to report the impeller rotational speed (RPM sensor).



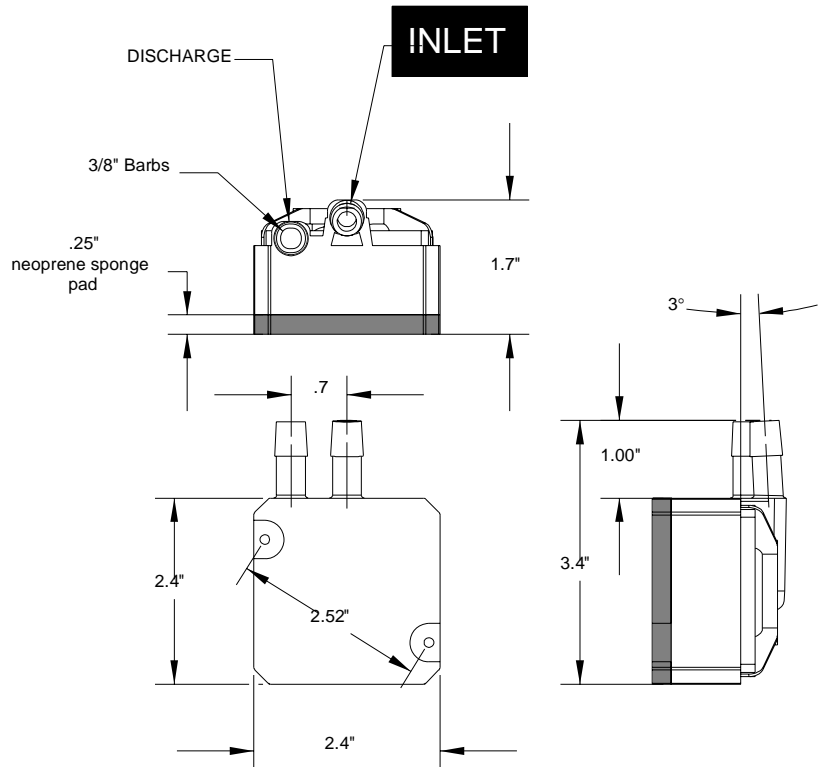
#### □ Physical installation

- Determine the best location for your pump by observing how the tubing will be routed to the rest of the circuit. Sharp bends in the tubing should always be avoided to prevent kinks, which will reduce or completely prevent flow of the cooling fluid.
- In general, we recommend installation of the pump at the bottom of the chassis, however the MCP350 can be installed in any desired position but one: It is preferable NOT to install the pump vertically with the inlet and outlet facing down, as this might leave a bubble in the pump cavity which could be difficult to bleed. Any other position is fine.
- The base of the pump features a soft neoprene pad coated with strong adhesive material. Once an appropriate location for the pump has been determined, simply peel-off the pad's protective paper, and press the pump against the chassis surface. The surface should be clean, and non greasy. Screws & grommets are also provided for permanent installation, and require drilling holes in the chassis (see permanent installation below).

#### □ Pump operating precautions:

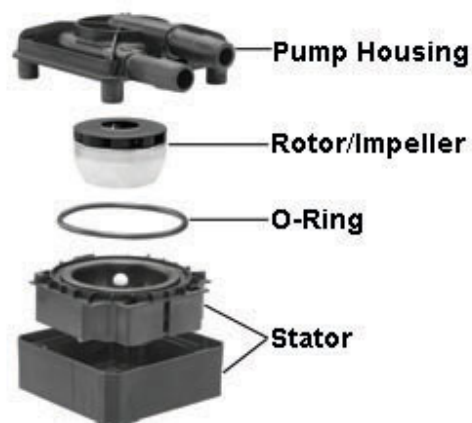
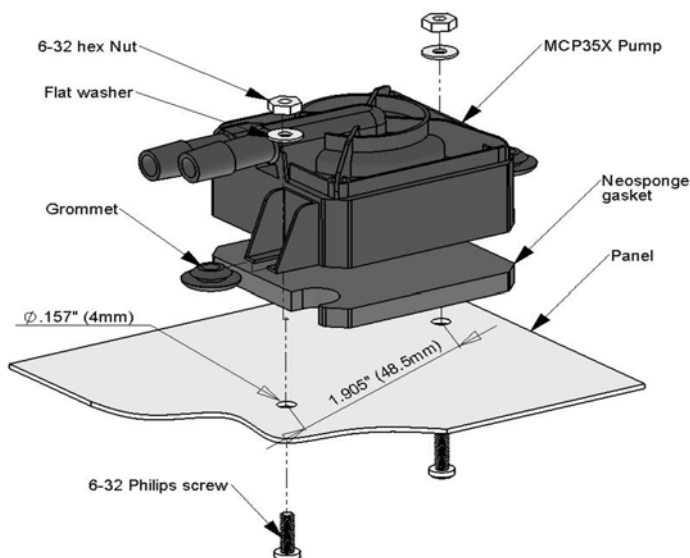
**The MCP350™ pump should never be run dry, even for a quick test.** You should always prime the pump with fluid before you start operating it. Running the pump dry does void your warranty. **With filled lines, turn the inlet/outlets upward to ensure there is no air bubble in the impeller.**

**Use of coloring dye or fluorescent additives** containing particulate fillers will cause excessive wear to the pump's impeller bearing, and void your warranty.



#### □ Permanent installation to the chassis, and exploded view

Drill two 0.312" (8mm) holes into panel, 2.52" (64mm) apart. Snap grommet into each hole. Tighten the provided screws until the pump neoprene pad is slightly and evenly compressed by approximately 1/8" (2~3mm) or less.



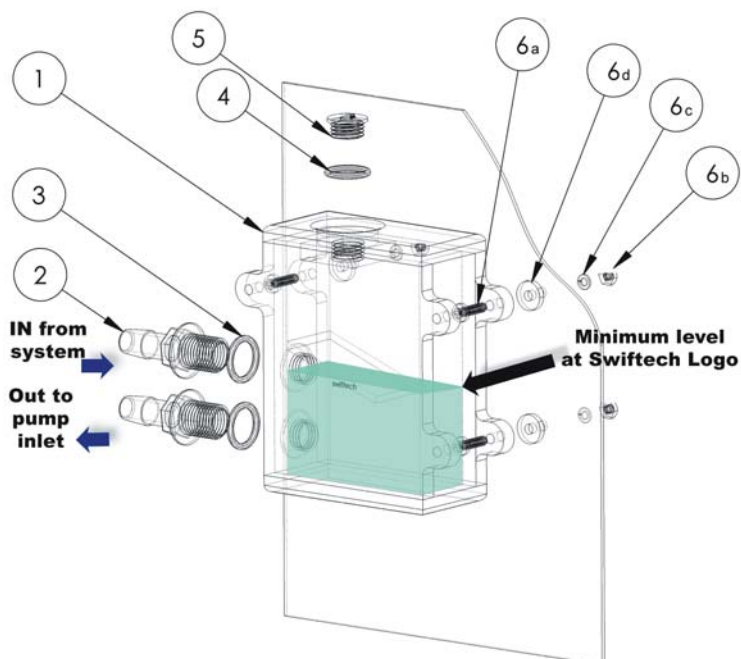
## 5. MCRES-MICRO RESERVOIR INSTALLATION

### ❑ Installation

- The MCRES-MICRO can be installed in any suitable location meeting its form factor requirements. For filling and bleeding purposes, it is preferable to hold or to install the MCRES-MICRO at the highest point of the liquid cooling loop. However, once filled and hermetically closed, the reservoir can be installed practically anywhere as long as it is kept upright as shown in figure 1. Also, to facilitate the filling and bleeding operations, you might want to wait until the circuit has been filled-up before you fasten the reservoir permanently to the chassis.
- Fastening the device to the case: two mounting methods can be used:
  - **Permanent mount** with the provided mounting hardware as shown in figure 1. Three holes will need to be drilled for a permanent mount. Simply use the reservoir as a template to mark the hole locations, and use a 0.150" (4mm) drill bit to drill the holes. Make sure to clean up any metal shavings from the case once you are done.
  - **Easy mount**, with the provided Velcro strips. This is a fairly secure mount, as we use extra strong Velcro. However, if your computer is to travel often (LAN parties for example), a permanent mount remains more suited for a more reliable fastening of the device.

The only critical precaution to take when installing the reservoir is to make sure that the discharge line (called "Out to pump inlet" in the schematic) is directly connected to the INLET of the pump. In other words, the pump (inlet) should be the first device connected to the reservoir discharge. Using a different routing will make the filling and bleeding of the circuit difficult, and may prevent the pump to prime properly.

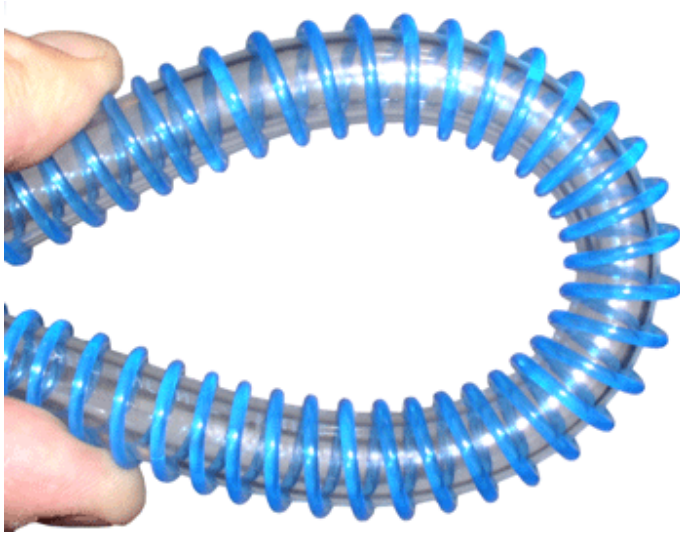
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	MCRES-MICRO	Reservoir	1
2	1-4" NPSM x 3-8" and 1-2" barb	Barb fitting	2 pairs each
3	O-RING-9557K473	Barb fitting O-Ring	2
4	pg7-o-ring	Fill-cap o-ring	1
5	pg7-plug	Pg7 Fill-cap	1
6	MOUNTING HARDWARE		3
6a	90272A152-6-32x0500philips	6-32 x 7/8" (22mm) Philips screw	1
6b	90760A007	6-32 Nut	1
6c	washer-91007A614	Lock Washer	1
6d	WASHER-RUBBER-437X150X092	Rubber Washer	1
7	panel		1



## 6. PREPARING THE TUBING

Now that your radiator, water-block, pump and reservoir are in place, it is time to cut segments of tubing and connect the devices together.

In addition to the supplied high quality vinyl tubing, your kit also comes with a 40" length of Smartcoils which, when extended provides a sufficient length to wrap 6 feet of tubing. Use of these coils is **mandatory** in order to prevent kinking and flattening of the tube over time.



*Example of wrapping for a tight bend. (shown with the blue version for picture clarity – The kit actually comes with clear coils).*

Tight radii sections require that coils be close to each other (1/8" spacing coil to coil). In straight sections, coils can be spaced up to 1/4" or more, coil-to-coil.

Gather the Smartcoils towards the center of the tubing, and then pull on the ends of the tubing. This will allow the coils to expand to their natural pitch.

Another technique to evenly spread the coils along the tubing consists in pushing one of the extremities of the coil clockwise. This will loosen the coils from around the tube, and allow you to spread them easily.

Then, with one end of a tube connected to a startup component such as the water-block for example, roughly estimate the length that you will need to the next component, and cut the tube and coil squarely with a pair of scissors. Work your way through the entire circuit in the same fashion, until you are satisfied with the tube routing.

- ❑ Once everything is connected, you should then adjust the Smartcoils coil spacing: adjust to a wide space between each coil (up to 1/4" or more if needed) when the tube is straight, and very close to each other in tight bends (approximately 1/8<sup>th</sup> of an inch or less).
- ❑ With everything in place, carefully double-check each connection. If it all looks tight and secure proceed to the next step.

**TIP!** Verify that each cooler will 'hang' naturally in very close to its mounted position. If the stiffness of the tubing, or the tight radius of the necessary bend, will not permit such, then it may be necessary to externally support the tubing: typically some strategically placed cable ties will facilitate this restraint. This precaution is particularly important with AMD® K7 class processors, but less so with Intel® Pentium® 4, Xeon, or AMD® K8 class processors.

## 7. PREPARING THE COOLANT

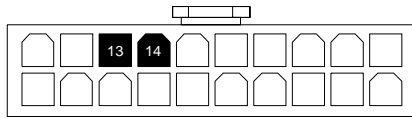
Your kit comes with a 2 Oz (60ml) bottle of Swiftech's specially formulated HydrX™ concentrated coolant. The product should be mixed with distilled water only. Simply empty the concentrated coolant into a 33 fl oz (1 liter) plastic bottle, and complete filling with distilled water. Your coolant is now ready. Note: a 5% mix might still allow some algae formation over prolonged usage if your system is continuously exposed to daylight (such as a clear acrylic case for example). Under such circumstances, we would suggest using a 10% mix.

**Use of alcohols (Alcohol Allyl, Amyl, Benzyl, Ethyl (Ethanol), Isopropyl, Methyl (Methanol), n-Butyl) or antifreeze products containing the listed alcohols is prohibited as it will result in deterioration of the reservoir over-time, and will void your warranty.** Resistance to Ethylene and Methylene glycol used in antifreeze products is excellent.

**Minimum Operating Level** is situated at the Swiftech Logo (approximately 1/2" of the reservoir). The reservoir should not be operated below this level, which could result in degradation of the system cooling.

## 8. RE-INSTALLING YOUR POWER-SUPPLY

Prior to fill-up the circuit, you will need to re-install your power-supply in order to start-up the pump during the fill procedure. You must be able to start the PSU without it being connected to the motherboard. While the Internet contains numerous references on how to use a paper-clip to short-out pin 13 and 14 of the 20 pin ATX connector as shown below, we nonetheless recommend instead using a power-supply tester. A wide variety of these common devices are available on the Internet (**Google** key word: "PSU tester"), and among Swiftech resellers ([www.frozenscpu.com](http://www.frozenscpu.com), [www.Directron.com](http://www.Directron.com), [www.newegg.com](http://www.newegg.com), etc.).



## 9. FILLING-UP THE CIRCUIT

Simply pour the coolant that you prepared into the reservoir – **carefully to avoid spills**, allowing the circuit to fill-up by simple gravity. Note: for the gravity to take effect the reservoir should be placed or held at the highest point of the cooling circuit. Once the reservoir is full, seal the fill port back with its cap in order to avoid any spills, and start-up the pump. The reservoir will quickly (within 1 second) empty itself. Immediately turn off the pump, top-off the fluid to the maximum level, and restart the pump. You need to repeat this operation 2 to 3 times, until the circuit is finally full of coolant. Then, allow the system to run 10 minutes uninterrupted to clear all the micro-bubbles and foam, and finally top-off the level one last time. Your liquid cooling circuit is now ready, and you may permanently (fasten with screws) if you so desire.

**Allow the system to run for (3) hours and frequently inspect all your connections for possible leaks before you reconnect and re-install all your components (motherboard, hard drives, etc.)**

CONGRATULATIONS, YOUR INSTALLATION IS NOW COMPLETE!

## 10. TROUBLESHOOTING

### ❖ *Air keeps circulating into the circuit, long after the pump has primed:*

- There is a significant pocket of air trapped into the circuit. In most cases this will be due to the fact that the radiator and/or the water-block where installed upside down. Temporarily dismount the device and re-orient right side-up until all the air has escaped back into the circuit.
- The fluid level is too low: top-off the reservoir to the appropriate level.
- One of the components connections is loose, or improperly tightened: Inspect each connection for traces of moisture, and tighten all worm-drive clamps, and various connections in the circuit.

### ❖ *The pump does not prime.*

It is likely that the circuit is not installed correctly. Please check that the reservoir discharge is duly connected to the pump inlet. Reminder: do not let the pump run dry.

### ❖ *The Coolant is filled with debris of some sort:*

Despite our best efforts, such as lengthy ultrasonic cleaning of the radiator, and careful inspection and cleaning of all the parts we manufacture, it is always possible that debris or some sort may be contaminating your circuit. When this happens it will significantly affect the performance of the APOGEE water-block, which mini-jets can be easily obstructed due to their small size. The circuit should then be completely flushed (see draining procedure below), and the APOGEE water-block should be disassembled for inspection and cleaning.

## 11. DRAINING THE SYSTEM

- ☐ Open up the fill-cap from the MCRES-Micro
- ☐ Then, you will need to disconnect a line from one of the lowermost components. Typically, this would be the pump. You need to procure a bucket large enough to receive approximately 1 liter of fluid, and place the bucket underneath the connection that you intend to "break". Disconnect the line, and place both ends into the bucket, until all the liquid is drained from the system.

## 12. PERIODIC MAINTENANCE

- ☐ Every 6 months: dust off the radiator fins and fan. You can use a can of compressed air for example, available in most electronic supply stores. If you live in a very dusty area, you should perform this task at closer intervals. It is essential to maintain the optimum performance of your cooling system.
- ☐ Inspect the liquid level inside the reservoir, and refill if necessary (no refills are normally necessary for 18 months of continuous usage). Evaporation in this closed circuit is extremely limited, but still present due to some permeability in the vinyl lines.