

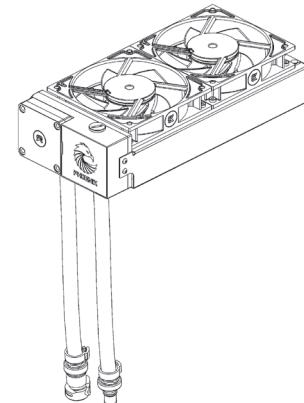
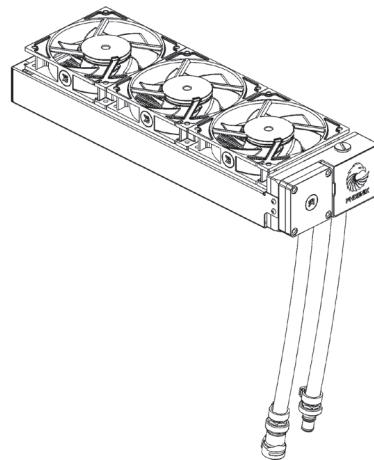


**PHOENIX**

For EK-MLC Phoenix series units | 1st revision, 2017

Pre-filled Modular Liquid Cooling

# EK-MLC PHOENIX



USER GUIDE



EK Water Blocks bears the name of its founder Edvard König, who started experimenting with liquid cooling in 1999. From the humble beginnings in the early years of the previous decade, the company grew steadily to become a global premium liquid cooling gear manufacturer. Today, EKWB offers a complete range of products for liquid cooling, from a renowned Supremacy line of CPU water blocks, to a wide range of CoolStream radiators, from in-house developed Vardar High pressure fans, to market-proven DDC and SPC series of liquid cooling pumps and thus provides overclocking enthusiasts and PC builders with the best of what the market can offer. Phoenix all-in-one Modular Liquid Cooling solution is the next step to bring extreme liquid cooling performance in the hands of dedicated gamers and PC enthusiasts around the world.

Welcome to EK-World!



## Safety precautions

1. Keep and store the product away from the reach of children.
2. Check the component list and condition of the product before installation.  
If there is any problem, contact the shop where you have purchased the product to get a replacement or refund.
3. EKWB d.o.o. is not responsible for any damages due to external causes, including but not limited to, improper use, problems with electrical power, accident, neglect, alteration, repair, improper installation and improper testing.
4. CPU, GPU and motherboard are subject to damage if the products are incorrectly installed.
5. This product is All-In-One Modular liquid cooling solution. Disassembling it and combining with parts, other than EK Water Blocks products, may lead to warranty loss.
6. Product warranty period is 24 months.

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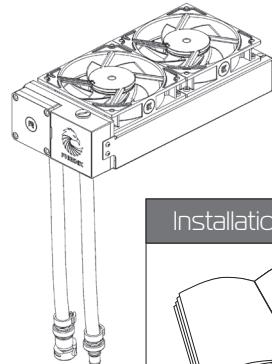
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## SCOPE OF DELIVERY

### RAD unit

All-in-one expandable liquid cooling unit

EK-MLC Phoenix (incl. QDC)



120  
240  
360  
140  
280

Installation manual

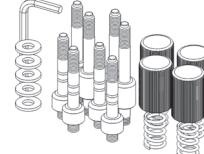


### CPU unit

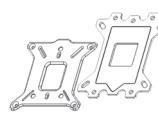
CPU liquid cooling unit



CPU Mounting mechanism



CPU Backplate mechanism

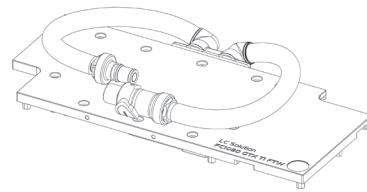


Thermal grease



### GPU unit

GPU liquid cooling unit



GPU Mounting mechanism

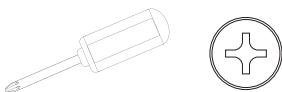


Thermal grease



## REQUIRED TOOLS

Phillips-head screwdriver



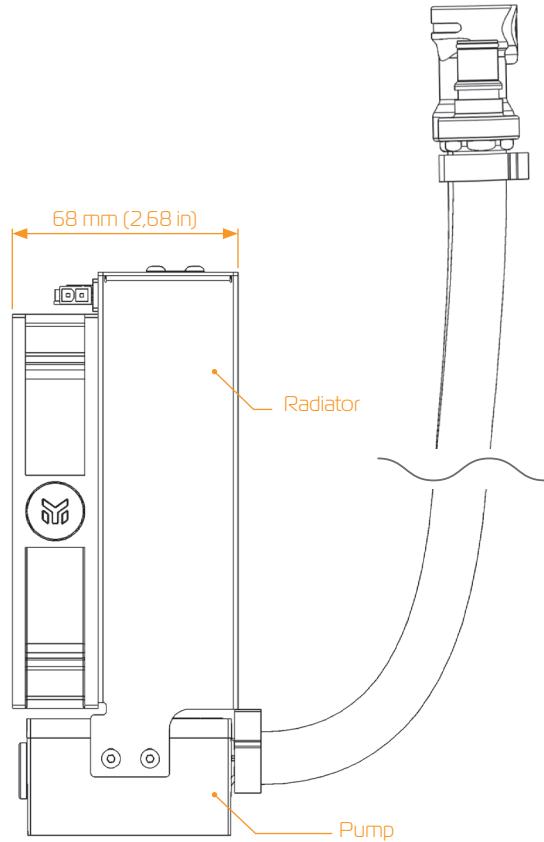
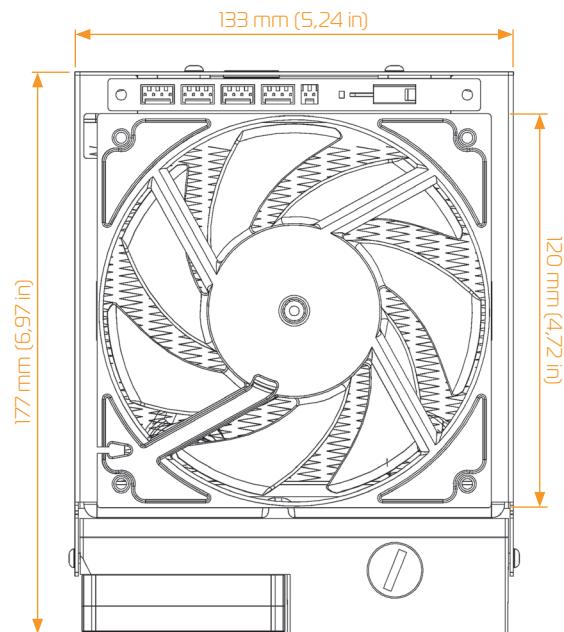
## VIDEO INSTALLATION GUIDES



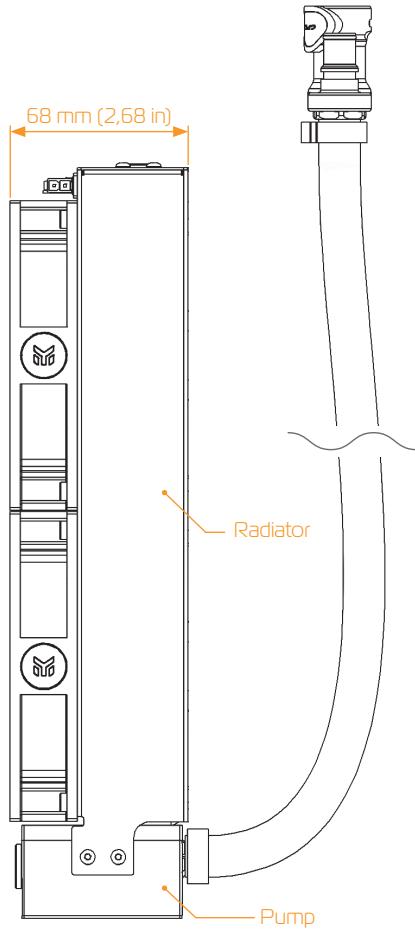
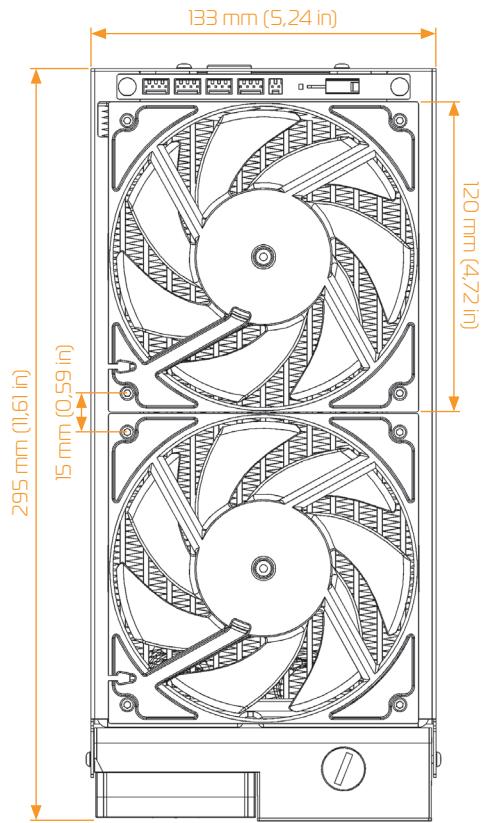
Our official YouTube channel features video installation guides, that can help you with Phoenix installation. Scan the QR code to visit our YouTube channel.

## RADIATOR SPACE CONSTRAINT REQUIREMENTS

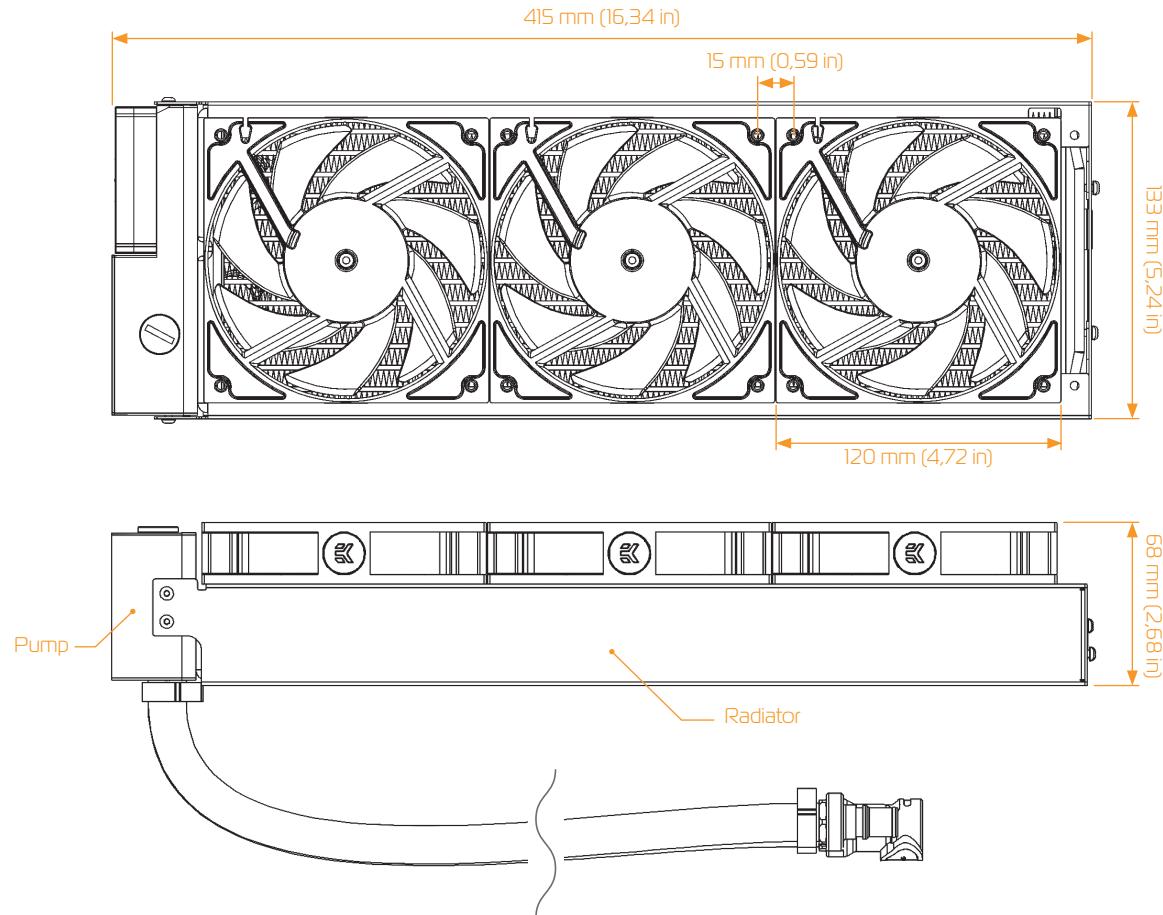
### EK-MLC PHOENIX 120



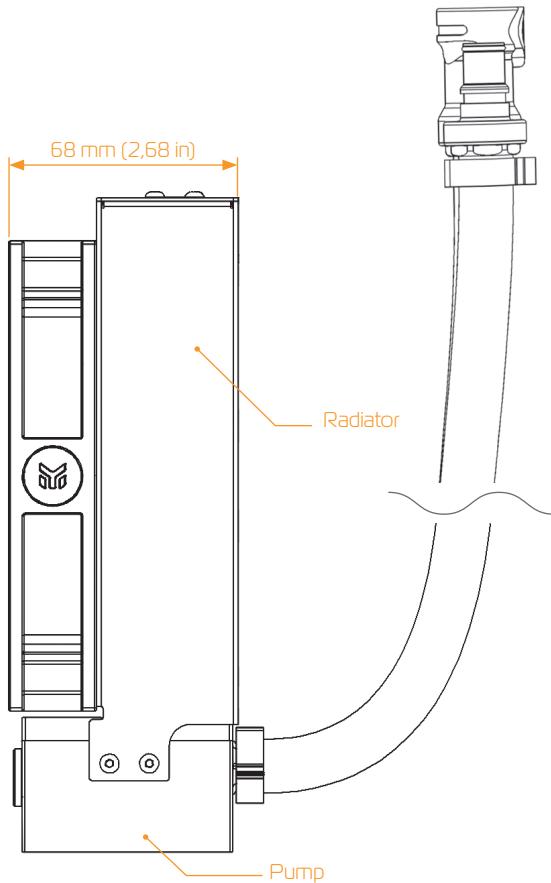
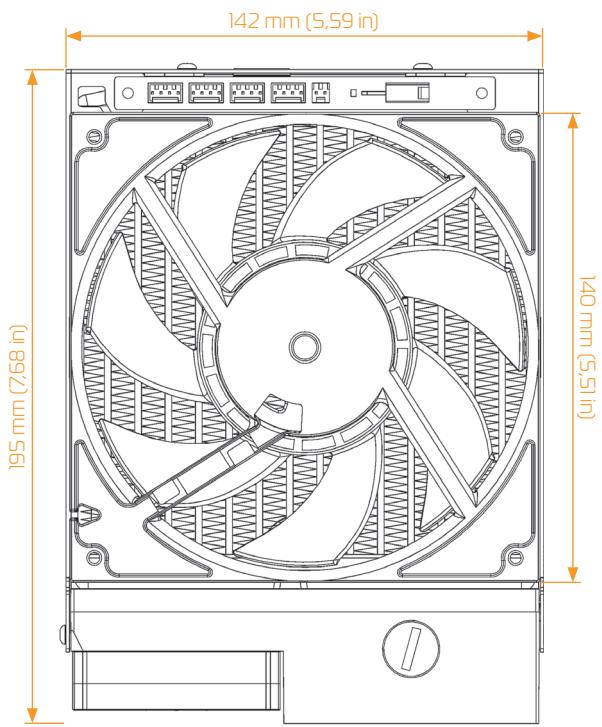
## EK-MLC PHOENIX 240



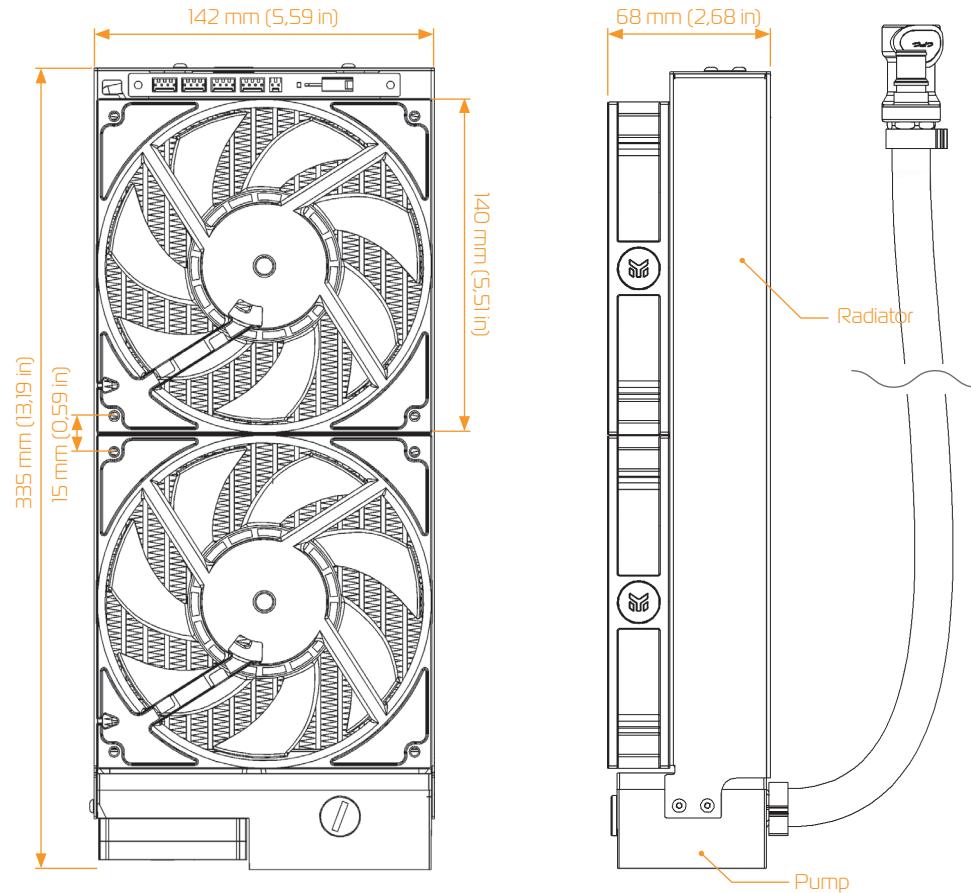
## EK-MLC PHOENIX 360



## EK-MLC PHOENIX 140



## EK-MLC PHOENIX 280



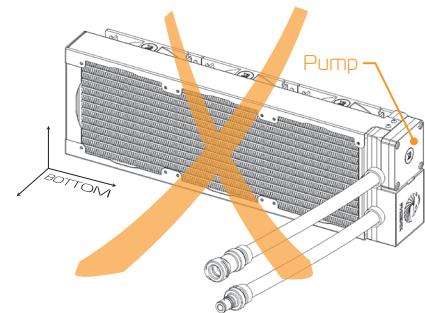
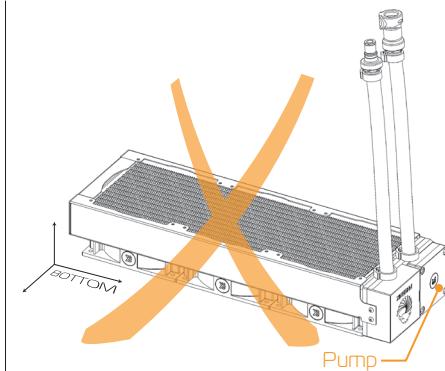
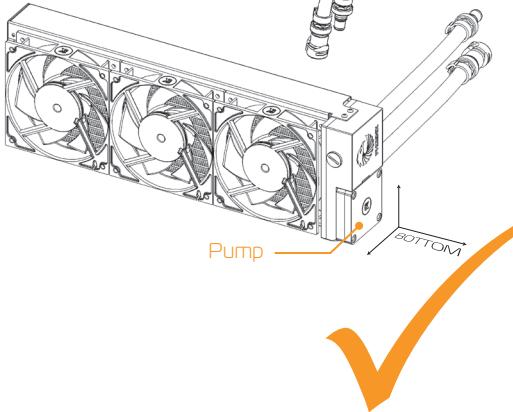
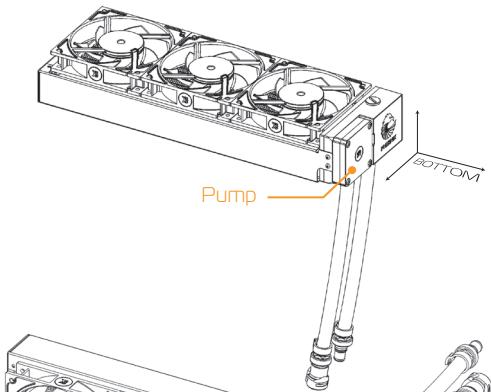
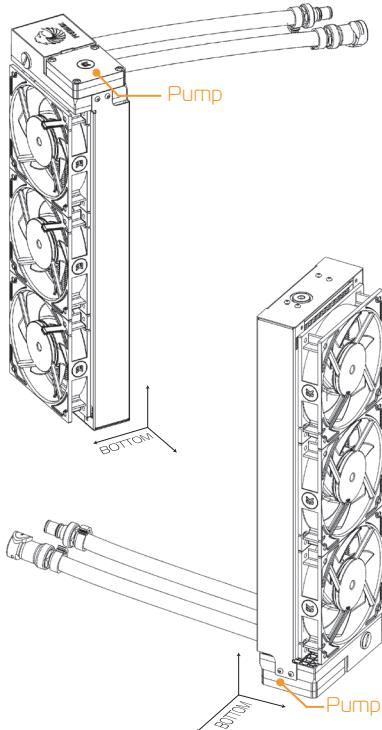
## UNIT ORIENTATION LIMITATIONS



### CAUTION:

The orientation of the unit is very important, as wrong installation may lead to insufficient cooling performance and premature failure of the unit.

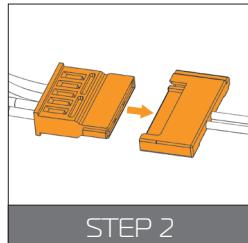
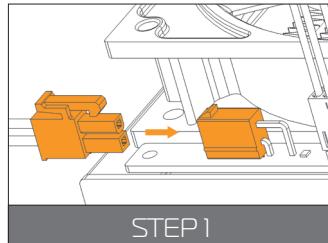
The orientation limitations stand for all versions of the Phoenix unit.



# EK-MLC PHOENIX QDC CONNECTIONS GUIDE

|                    | Only CPU Module | Only GPU Module | CPU & GPU Module | Two GPU Modules (no CPU Module) |
|--------------------|-----------------|-----------------|------------------|---------------------------------|
| EK-MLC Phoenix 120 | ✓               | ✓               | ✗                | ✗                               |
| EK-MLC Phoenix 240 | ✓               | ✓               | ✓                | ✓                               |
| EK-MLC Phoenix 360 | ✓               | ✓               | ✓                | ✓                               |
| EK-MLC Phoenix 140 | ✓               | ✓               | ✗                | ✗                               |
| EK-MLC Phoenix 280 | ✓               | ✓               | ✓                | ✓                               |

## ELECTRICAL CONNECTIONS



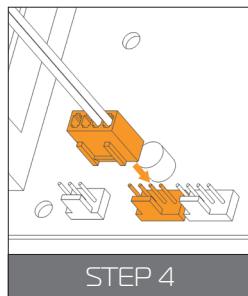
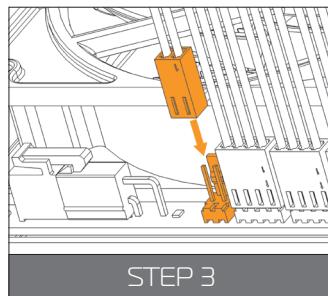
### CONNECTING THE HUB TO THE POWER SUPPLY

#### STEP 1:

Take the enclosed power cable and plug the two-pin PCI-express minifit power connector to the fan splitter hub.

#### STEP 2:

Use the SATA POWER connector at the other end and plug it to the female connector found on the main power supply.



### CONNECTING THE HUB TO THE MOTHERBOARD

In order to obtain the PWM fan speed control you must follow the steps below:

#### STEP 3:

Take the enclosed connection cable and plug the two-pin cable connector to the fan splitter hub.

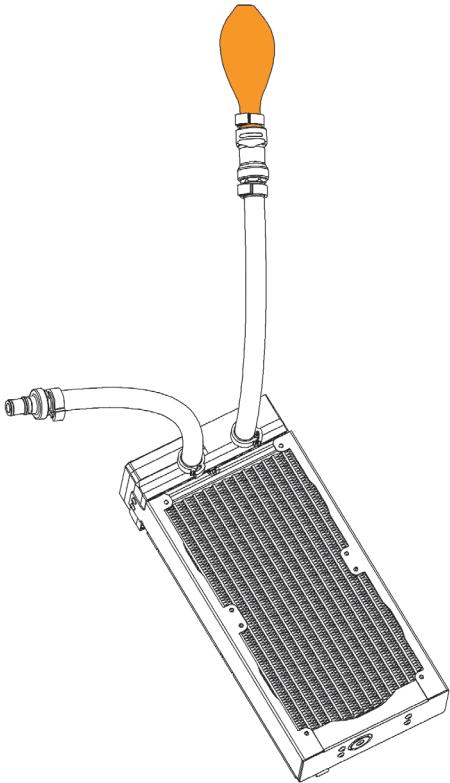
#### STEP 4:

Use the 4-pin connector at the other end and plug it to the male connector header located on the motherboard. Always use CPU-dedicated fan headers if possible.

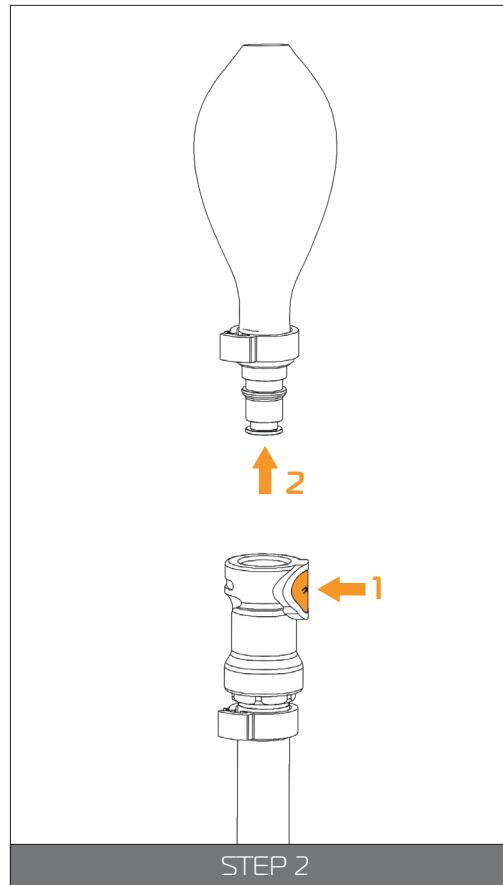


Always use CPU fan header. On majority of motherboards these headers usually offer best PWM regulation.

## REMOVING THE EXPANSION BALLOON



STEP 1



STEP 2

Please remove the expansion balloon from your EK-MLC Phoenix and GPU/CPU water blocks; it is recommended that you do this before installing the units into your chassis, to prevent any coolant spillage on your PC components.

### STEP 1:

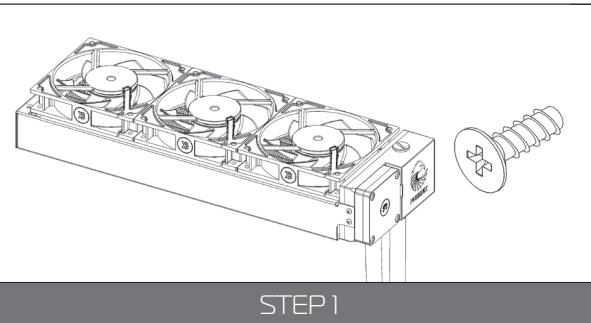
Rotate your Phoenix unit so that expansion balloon is facing upwards as shown in the picture to remove any potential air bubbles and to prevent any unnecessary coolant spillage.

### STEP 2:

Firstly, have some paper tissues or a towel ready, because you may spill some coolant during the balloon removal. Grab the braided tube just below the QDC system and wrap it with a paper tissue or a towel. Disconnect the expansion balloon installed on your EK-MLC Phoenix using the QDC. First you need to press the button on the QDC to release the mechanism which holds it together. After that you should be able to gently pull the expansion balloon away from the unit.

Repeat the process with your GPU and CPU water blocks.

# INSTALLING THE PUMP/FAN/RADIATOR UNIT



STEP 1

## STEP 1:

Mounting of the pump/fan/radiator unit requires special attention.

Please take the unit and find the enclosed standard fan mounting screws. You will need 4 screws for the 140mm and 120mm version, 8 screws for 240- and 280mm version or 12 screws for 360mm version and a phillips-head screwdriver which is not enclosed in the package.

## STEP 2:

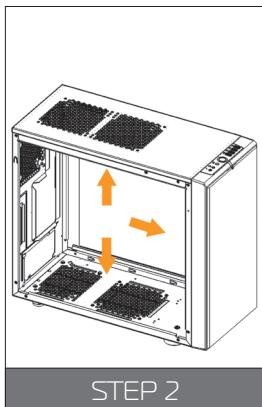
Prepare your suitably-sized PC chassis for installation of EK-MLC Phoenix.

The position of the unit in the chassis depends on the size, fan mounting holes and the hardware you have installed.

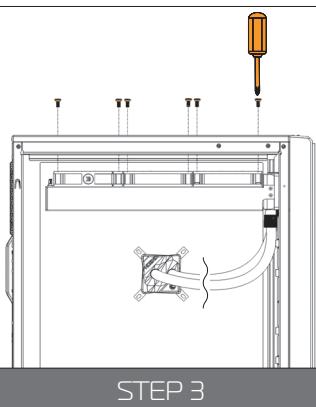
You must make sure that the unit fits into the chassis. Usually the chassis have standard fan mounting holes pre-drilled so you should look for holes with spacing of 105mm (a standard computer 120mm cooling fan) or 125mm (for 140mm cooling fan).



Out-of-the box, the Phoenix is set to work in overall hot air exhaust (by placing the radiator on the exhaust) configuration. This results in overall decrease of temperature throughout the entire computer chassis but also leads to slightly higher liquid temperatures. A reversed air flow is a viable option but one should always strive to achieve unidirectional flow of air throughout the chassis. See page 26, chapter Frequently Asked Questions, on how to change fan orientation.



STEP 2



STEP 3

## STEP 3:

When you have selected the mounting position within the chassis you must align the Phoenix cooling fan mounting holes with the ones on the chassis.

Use enclosed self-tapping screws to firmly install the unit. Self-tapping screws require more torque than threaded screws, but overall do not exaggerate with the force applied.

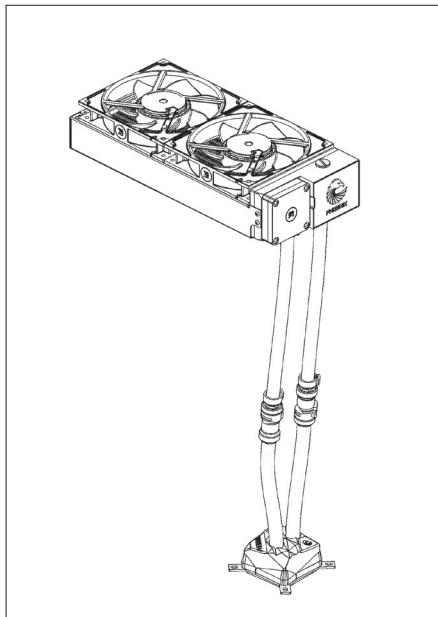


Check again that the unit isn't touching the chassis anywhere except at the mounting region. Some unwanted noise may occur if the vibrations are transferred from the unit to the PC chassis.

## INSTALLING THE COOLING MODULES

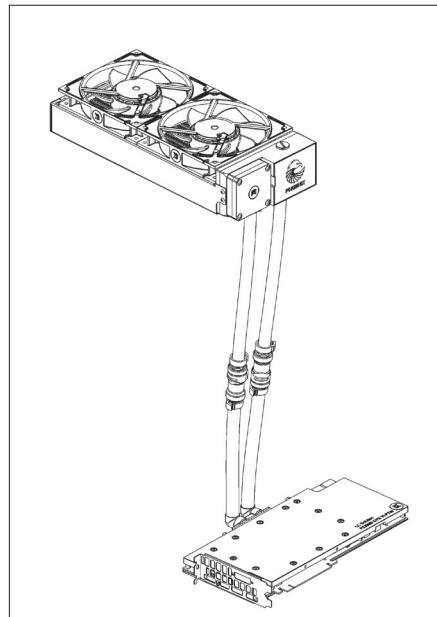
### Only CPU Module

If you bought the Phoenix with CPU water block, follow the instructions for CPU block installation on pages 15-21 and on pages 22-24 for QDC connections guide.



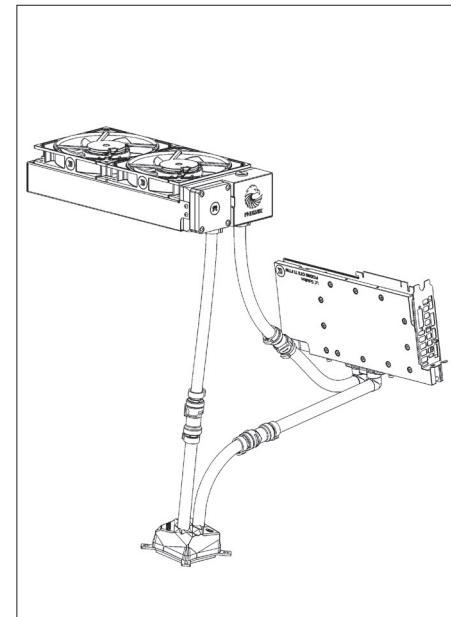
### Only GPU Module

If you bought the Phoenix with GPU water block, follow the instructions in the GPU water block user manual, and when you are done, read the pages 22-24 for QDC connections guide.

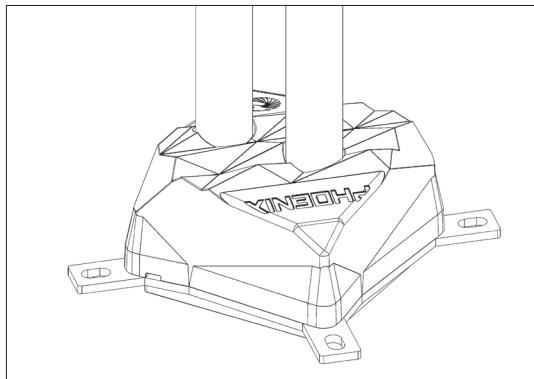


### CPU & GPU Module

If you bought the Phoenix with CPU and GPU water blocks, please read pages 15-21 for CPU block installation and your GPU block user manual; follow the instructions on pages 22-24 for QDC connections guide.



# GENERAL INFORMATION ON WATERBLOCK COMPATIBILITY



CPU liquid cooling units are pre-assembled for use with modern Intel and AMD desktop socket type motherboards. By default (out of the box), our water blocks support the following CPU sockets:

- Intel® Socket LGA-115x
- Intel® Socket LGA-2011(-3)
- AM4 Socket Motherboards



Narrow server type LGA-2011 is not supported by default – a mounting plate Supremacy LGA-2011 narrow ILM (EAN: 3830046990600) is mandatory to install this water block on narrow server type LGA-2011 motherboards. Replacing the mounting plate requires disassembly of the water block.

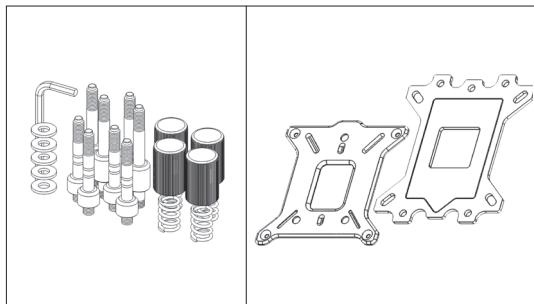
Legacy sockets LGA-775 and LGA-1366 are compatible when installed using optional EK-Supremacy EVO Backplate.



Compatibility with AMD socket type motherboard is ensured via optional mounting plate add-ons, available for separate purchase. Please visit [www.ekwb.com](http://www.ekwb.com) for more details.



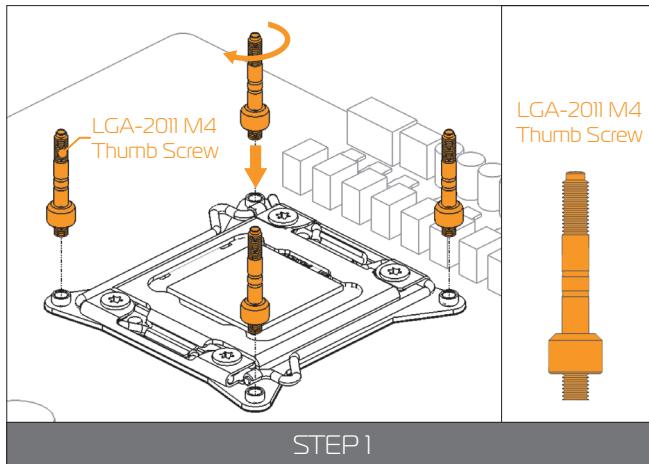
## WHAT IS ENCLOSED



The following items are enclosed with EK-MLC Phoenix unit CPU water block

- **EK-MLC Phoenix CPU water block**
- **PreciseMount universal CPU mounting mechanism:**
  - M4 threaded thumb screws (4 pcs)
  - LGA-2011 M4 threaded mounting studs (4pcs)
  - AM4 threaded mounting studs (4pcs)
  - Springs (4 pcs)
  - M4 threaded thumb nuts (4 pcs)
  - Washers (4 pcs)
- **EK-Backplate**
  - Backplate for Intel LGA-115x

# INSTALLING THE CPU COOLING MODULE



## LGA-2011(-3) SOCKET MOTHERBOARDS

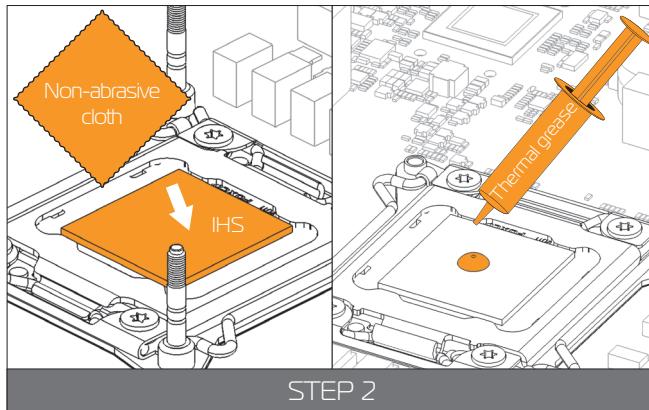
### STEP 1:

Prepare the zip bag containing CPU mounting mechanism screws which was enclosed with the EK-MLC Phoenix unit.

Install four (4) specific LGA-2011 M4 thumb screws into four M4 threaded stubs on the LGA-2011 socket integrated latch mechanism (ILM). The screws are to be installed using no tools (i.e. pliers).



It is not necessary to remove the LGA-2011(-3) type motherboard from the PC chassis in order to install CPU water block mounting screws unless forced to do so due to space constraint limitations of certain computer chassis.



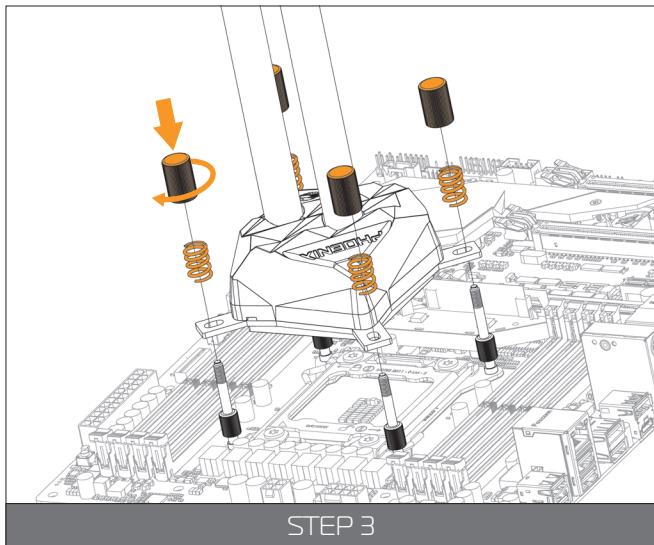
### STEP 2:

**Cleaning the CPU:** Wipe the CPU's contact surface (by using non-abrasive cloth or Q-tip, as shown on sample photo).

**Applying thermal compound:** EK recommends blob or line method of applying the enclosed EK-TIM Ectotherm thermal compound to the CPU heat spreader (IHS) - see sample photo on right.



The quantity of about two rice grains is just about right. There is no need to cover the whole IHS. Applying too much thermal grease will have negative impact on the cooling performance!



### STEP 3:

Align the water block over the mounting screws on the LGA-2011(-3) motherboard with pre-installed CPU.



Before proceeding with the installation It is mandatory to remove the protective foil from the backside of the water block.

Place an enclosed compression spring and thumb nut over each M4 thumb screw. Start fastening two thumb nuts at a time, preferably in cross pattern and do not tighten them fully until all of them are partially screwed in. Then - using your fingers only - screw in all four thumb nuts until you reach the end of the thread. Do not use any tools (such as pliers) during this process.

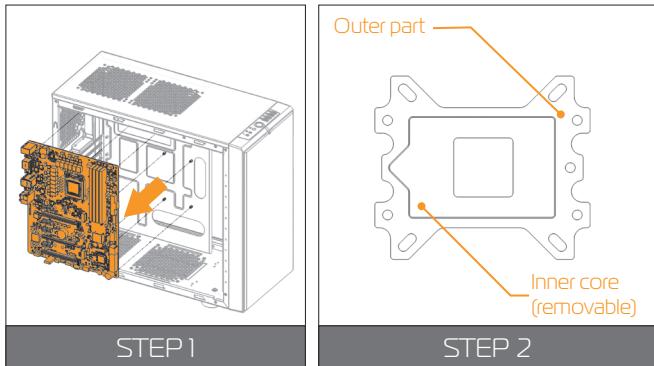
CPU Module installation is now complete. Continue to page 22 for connecting the module with QDC.



#### Starting your computer up:

Before you add the power to your computer please check if everything is installed according to the installation manual.

When turning on the computer be careful nothing is leaking and that the temperatures of the CPU are normal. It is best practice to enter BIOS/UEFI and check hardware health monitoring section on initial boot!



## LGA-115x SOCKET MOTHERBOARDS

### STEP 1:

If already installed, please remove the motherboard from your computer and place it on an even surface with front facing down.

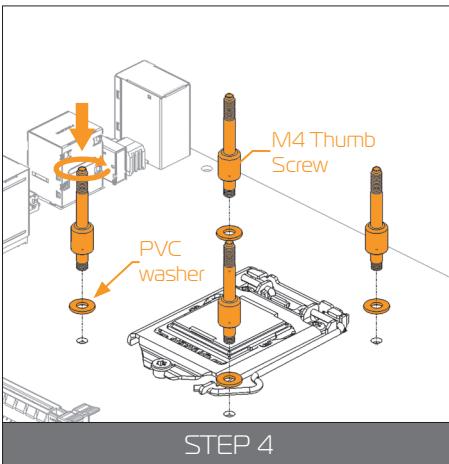
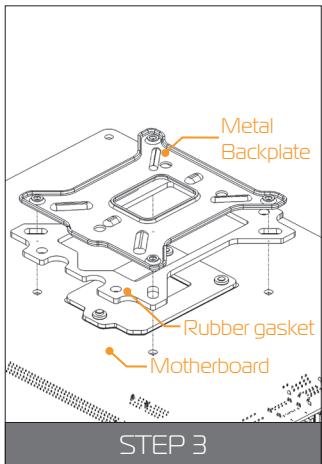
### STEP 2:

#### Preparing backplate rubber gasket

The enclosed rubber gasket is essential part of the backplate and mounting system and must be used every time you install this water block on your motherboard.



The rubber gasket has a partially cut inner part which needs to be removed when installed on Intel LGA-115x motherboard. The rubber is held on four places and can be peeled away with hand.



STEP 3

STEP 4

### STEP 3:

Install backplate rubber gasket and place metal backplate for Intel LGA-115x socket to the back of your motherboard RIBBED SIDE UP! (facing away from the motherboard). Align the holes on the motherboard with holes on rubber gasket and backplate.



Make sure to orientate the rubber gasket to fit past the CPU socket ILM backplate.

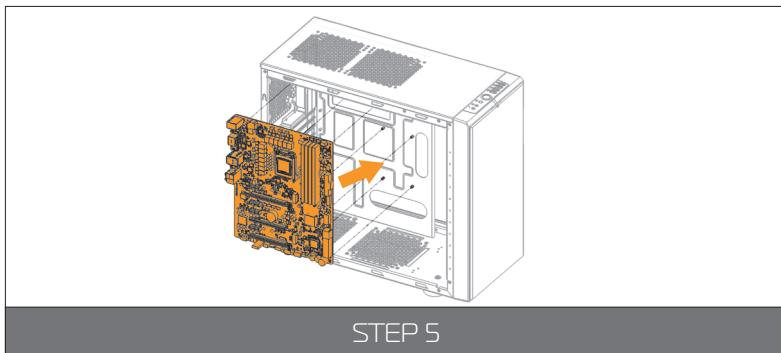
Carefully rotate motherboard assembly with front side facing up with one hand while holding the backplate and rubber in place with the other hand.

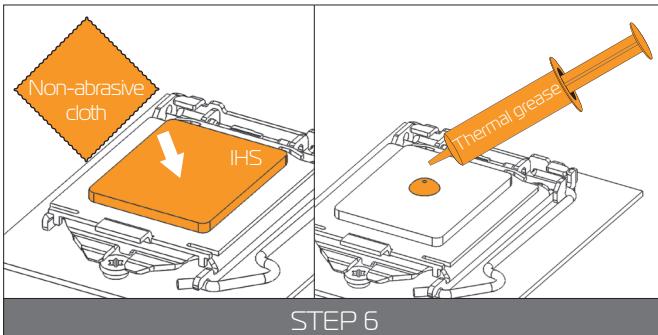
### STEP 4:

Install four (4) M4 thumb screws onto your motherboard. It is mandatory to put 0.7mm plastic washer underneath each of the M4 thumb screws. Tighten the screws to the metal backplate until you reach the end of the thread. Using tools (such as pliers) is not recommended.

### STEP 5:

Install the motherboard back into the computer chassis





**STEP 6**

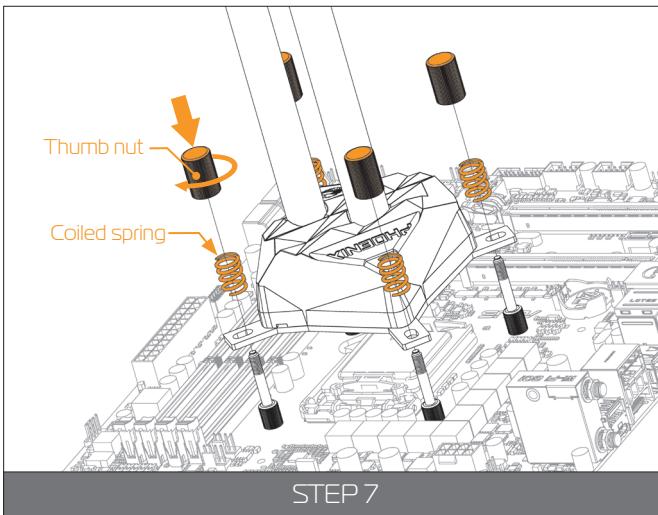
## **STEP 6:**

Cleaning the CPU: Wipe the CPU's contact surface (by using non-abrasive cloth or Q-tip, as shown on sample photo).

**Applying thermal compound:** EK recommends blob or line method of applying the enclosed EK-TIM Ectotherm thermal compound to the CPU heat spreader (IHS) - see sample photo on right.



The quantity of about two rice grains is just about right. There is no need to cover the whole IHS. Applying too much thermal grease will have negative impact on the cooling performance!



**STEP 7**

## **STEP 7:**

Align the water block over the mounting screws on the LGA-115x motherboard with pre-installed CPU.



Before proceeding with the installation It is mandatory to remove the protective foil from the backside of the water block.

Place an enclosed coiled spring and thumb nut over each M4 thumb screw. Start fastening two thumb nuts at a time, preferably in cross pattern and do not tighten them fully until all of them are partially screwed in. Then – using your fingers only screw in all four thumb nuts until you reach the end of the thread.

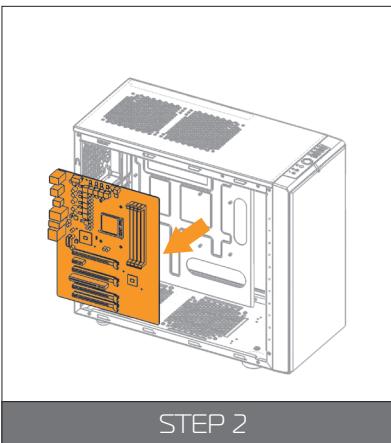
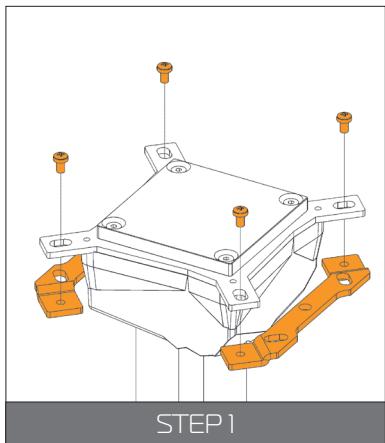
CPU Module installation is now complete. Continue to page 22 for connecting the module with QDC.



### **Starting up your computer**

Before you add the power to your computer please check if everything is installed according to the installation manual.

Turn on your computer. When turning on the computer check that the temperatures of the CPU are normal. It is best practice to enter BIOS/UEFI and check hardware health monitoring section on initial boot!



## AM4 SOCKET MOTHERBOARDS

### STEP 1

Install mounting AMD bracket add-on over the Intel mounting plate. Use Philips screw driver to tighten four M4x5 DIN7985 screws to secure it.

Please note the orientation of the add-on brackets. It is mandatory to install them with raised side facing towards copper base.

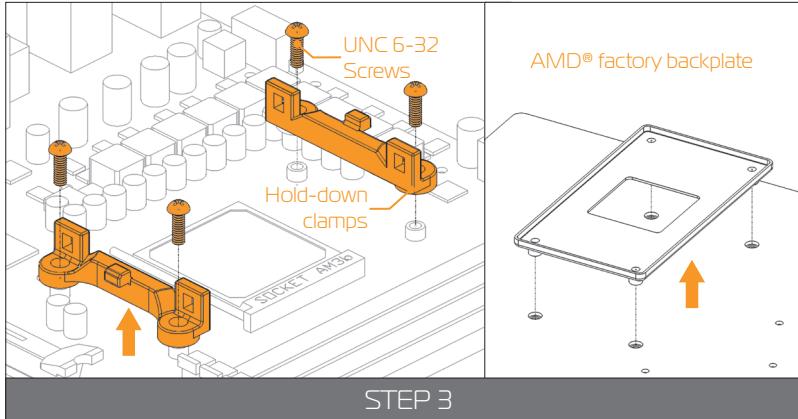
### STEP 2

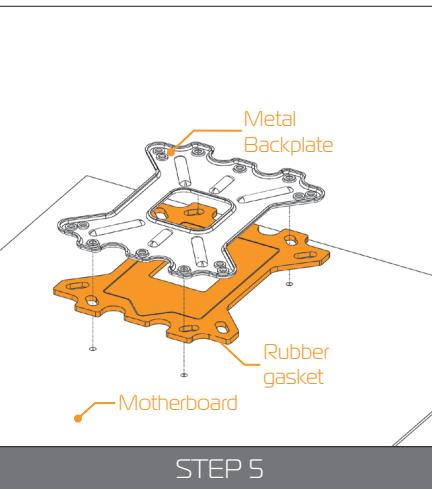
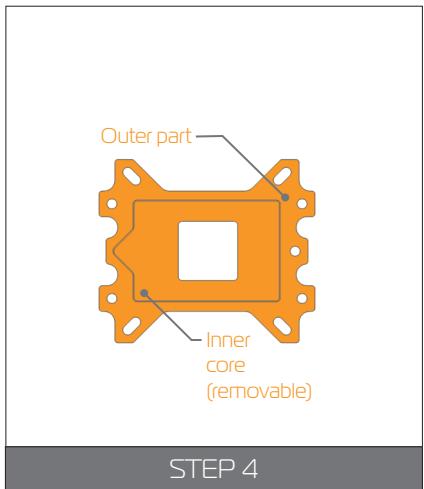
If already installed, please remove the motherboard from your computer and place it on an even surface with front facing up.

### STEP 3

#### Removing of the original plastic hold-down clamps and the factory backplate:

Using Philips-head screwdriver remove the four UNC 6-32 screws securing the original plastic hold-down clamps around the socket as shown on the sketch. Remove the original AMD® backplate and the hold-down clamps and store them away. See sketch for further part identification.





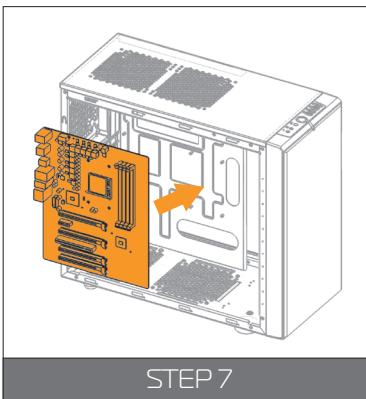
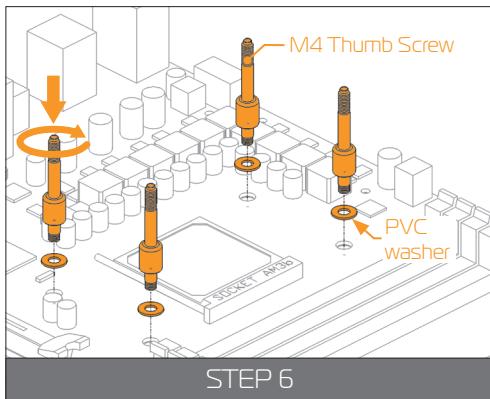
## STEP 4

### Preparing backplate rubber gasket

The enclosed rubber gasket is essential part of the backplate and mounting system and must be used every time you install this water block on your motherboard.



With AMD® Sockets you should use whole rubber backplate including the inner core.



## STEP 5

Install backplate rubber gasket and place metal backplate for AMD® socket to the back of your motherboard RIBBED SIDE UP! (facing away from the motherboard) Align the holes on the motherboard with holes on rubber gasket and backplate.

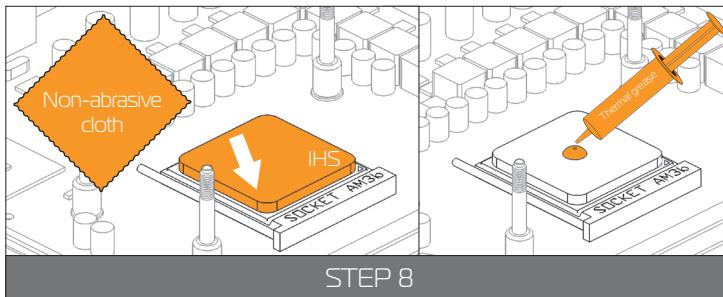
Carefully rotate motherboard assembly with front side facing up with one hand while holding the backplate and rubber in place with the other hand.

## STEP 6

Install four (4) M4 thumb screws onto your motherboard. It is mandatory to put 0.7mm plastic washer underneath each of the M4 thumb screws. Tighten the screws to the metal backplate until you reach the end of the thread. Using tools (such as pliers) is not recommended.

## STEP 7

Install the motherboard along with the thumb screws back into the computer chassis.

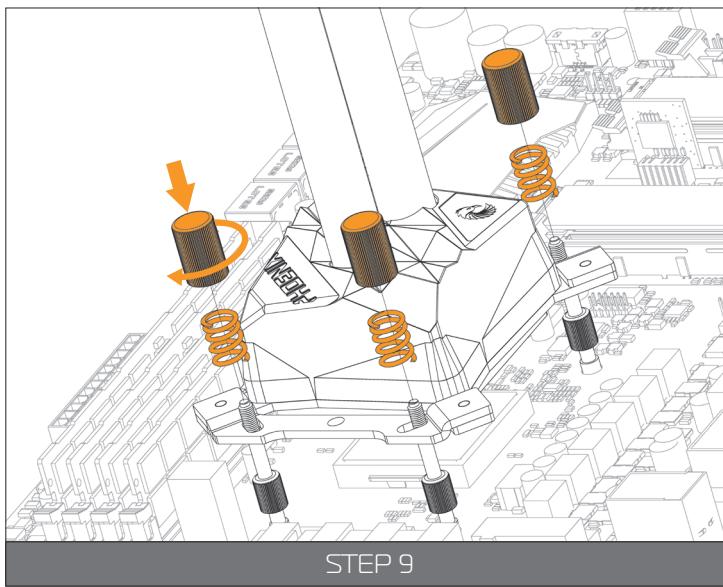


## STEP 8

**Cleaning the CPU:** Wipe the CPU's contact surface (by using non-abrasive cloth or Q-tip, as shown on sample photo).

**Applying thermal compound:** EK recommends blob or line method of applying the enclosed compound to the CPU heat spreader (IHS) - see sample photo on right.

 The quantity of about two rice grains is just about right. There is no need to cover the whole IHS. Applying too much thermal grease will have negative impact on the cooling performance!



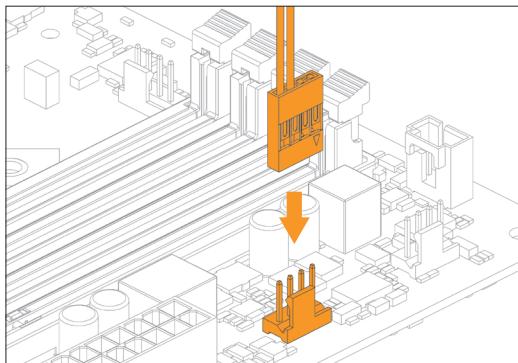
## STEP 9

Align water block with pre-installed mounting mechanism above the AMD socket with pre-installed CPU. Place an enclosed coiled spring and thumb nut over each M4 thumb screw. Start fastening two thumb nuts at a time, preferably in cross pattern and do not tighten them fully until all of them are partially screwed in.

Then – using your fingers only screw in all four thumb nuts until you reach the end of the thread.

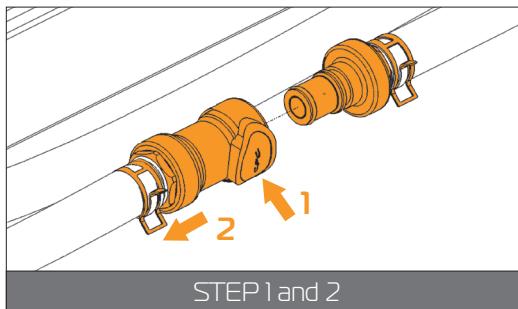
CPU Module installation is now complete. Continue to page 22 for connecting the module with QDC.

## CONNECTING THE LED



Plug the LED connector from your Phoenix CPU block to the FAN HEADER (usually labelled as SYS\_FAN or CPU\_FAN) on your motherboard. Be careful about the orientation of the connector (use picture below as reference).

## CONNECTING THE MODULES WITH QDC



Being modular in design, the EK-MLC Phoenix can be fitted with CPU or GPU water blocks (or both, depending on the variant-see EK-MLC Phoenix QDC Connections Guide).



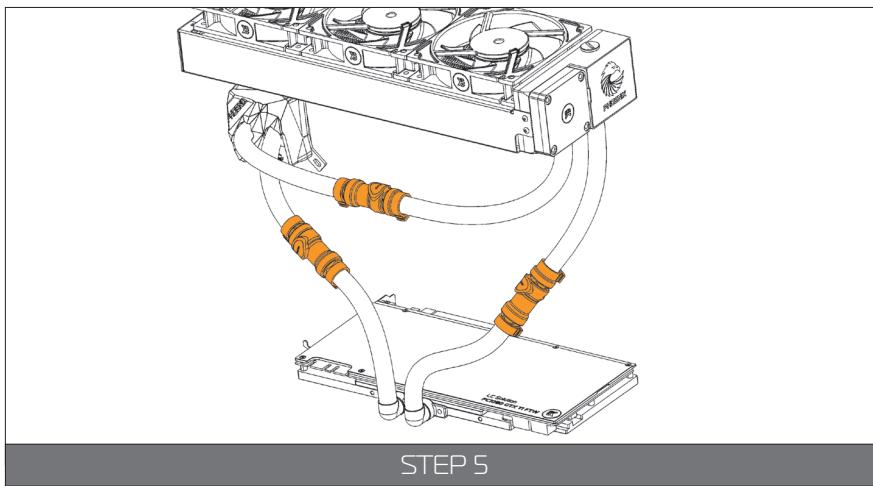
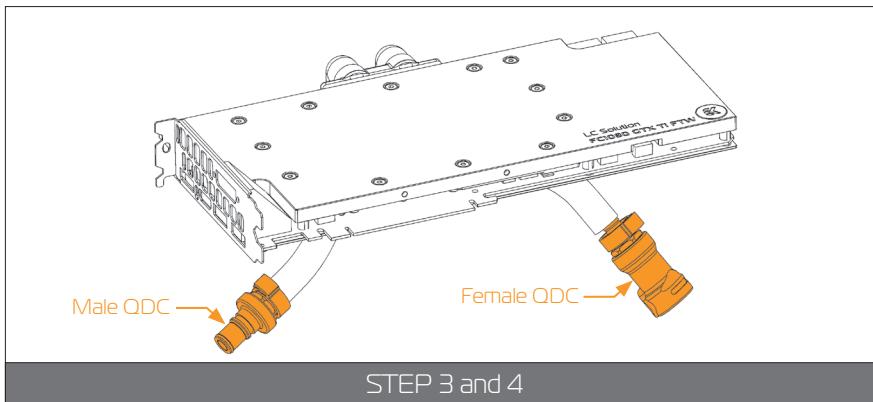
There is no need to unmount the unit from the chassis unless you face serious tube routing constraints. Because of the no-spill quick disconnect couplings the expansion is very quick, easy and safe when using QDC-enabled water blocks.

Required tools (in case of need to refill the loop):

- **6mm Allen key (usually enclosed with the water block)**
- **ATX Bridging plug**

### STEP 1:

Turn off your computer and unplug the computer from power.



## STEP 2:

Disconnect the QDC installed on the EK-MLC Phoenix with QDC. First you need to press on the button on the QDC to release (disconnect) the mechanism which holds it together. After that you should gently pull it apart and you are done.

## STEP 3:

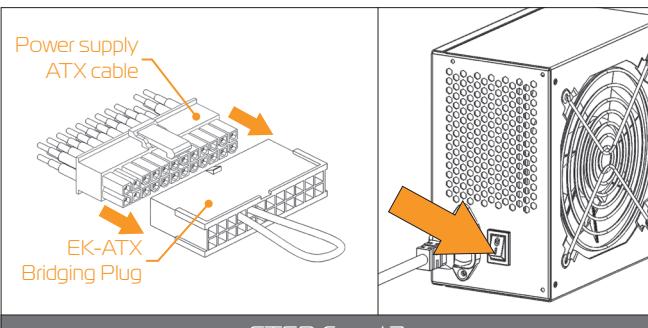
Install the QDC enabled pre-filled water block onto your graphics card or CPU as per installation manual (which came with the water block) and install it into your PCI-express expansion slot on your computer.

## STEP 4:

Route the tubes in the way that the QDC's can be connected with the present ones on the EK-MLC Phoenix. The tubes should be long enough to do so.

## STEP 5:

Connect the QDC couplings according to the sketch on the right. You will feel the locking click sound when assembled correctly.



STEP 6 and 7

#### STEP 6:

Plug in the ATX bridging plug. Make sure nothing except the fan splitter hub is plugged to the power supply. You must also unplug the fan and the PWM connectors from the fan splitter hub (Page 10)

#### STEP 7:

Turn the power supply on and check that only the pump is running.

#### STEP 8:

It is always a good practice to conduct a 24-hour leak test to ensure the system is leak free and safe to use. Once the test is complete power off the power supply unit and remove the EK-ATX Bridging Plug from the main 24pin ATX cable.

Upon completing the leak test you can safely reconnect all motherboard, graphics card and SATA power cables. Your computer is now ready to use.

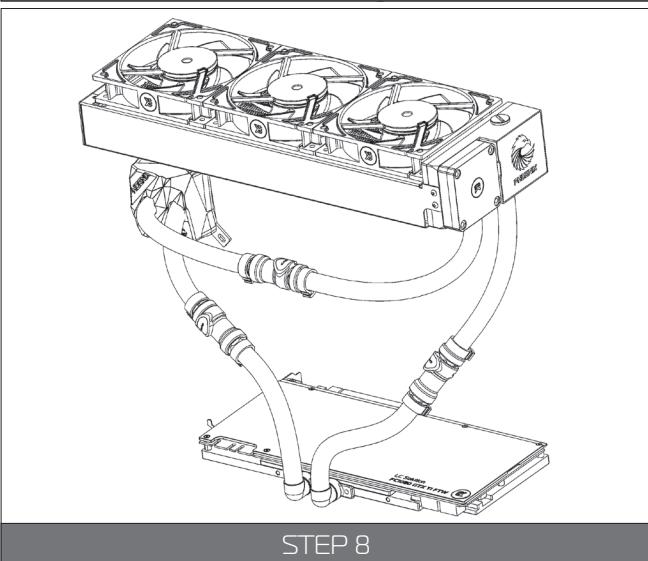


Before you add the power to your computer please check if everything is installed according to the installation manual.

#### STEP 9:

#### Starting up your computer

Turn on your computer. When turning on the computer check that the temperatures of the CPU are normal. It is best practice to enter BIOS/UEFI and check hardware health monitoring section on initial boot!



STEP 8

In order to obtain the best performance through whole lifespan of the product it is crucial to follow these maintenance tips:

### TIP 1: DUST REMOVAL

It is mandatory to remove the dust every **2-3 months**. EK recommends to use a vacuum cleaner or compressed air to blow the dust away. Radiator is usually the most dusty, so pay special attention to that. Do not forget to turn off the computer and unplug the power supply. It is recommended to remove the dust outside.

### TIP 2: CHECKING ELECTRICAL COMPONENTS

Once a year you should check the pump and the fans, if they are running as they should. The pump and fans must run silently without any rattling noises and must react to PWM duty cycle changes. All imperfections may lead to overheating and breakdown.

### TIP 3: CLEANING THE UNIT (RELATED TO CHAPTER TROUBLESHOOTING)

Every **3 years** the unit should be thoroughly cleaned. You must let all the coolant out. The radiator must be flushed and the pump checked and cleaned.

### TIP 4: USE EK DESIGNED AND MANUFACTURED PARTS ONLY

It is recommended to use only genuine EK Water Blocks liquid cooling gear, parts and add-ons to prevent any performance, compatibility and warranty issues.

## FREQUENTLY ASKED QUESTIONS

**Q** Is MLC Phoenix compatible with all desktop LGA-2011(-3) motherboards? How about older LGA-1366 and -755?

A: Yes, due to the use of new mounting mechanism the MLC Phoenix is fully compatible with all standard LGA-2011-3 motherboards, regardless of whether the motherboard has a hole cut-outs on the circuit board.

It is possible to use the Phoenix on the older LGA-1366 and LGA-775 type motherboards by purchasing the optional EK-Supremacy EVO Backplate [EAN: 3830046990648]



## **Q** How many water blocks can you add to the loop?

A: The EK-MLC Phoenix liquid cooling unit can be upgraded with several additional parts. However in order to keep performance at a reasonable level it is recommended not to upgrade EK-MLC Phoenix with no more than:

- one (1) GPU or CPU water block (Phoenix 120, 140)
- two (GPU & CPU) water blocks (Phoenix 240, 280, 360)

Additionaly you can add another GPU water block to Phoenix 280 and 360 (see EK-MLC Phoenix QDC Connections Guide on page 10).



**NOTE:** To achieve the best performance it is highly recommended to run pump at full speed when expanding the Phoenix unit with additional water blocks. Please consult page 32 of this manual.

## **Q** What flow rates are to be expected with EK-MLC Phoenix?

A: The Phoenix units typically operate at about 150L/h at full speed respectively.

Installing a typical GPU pre-filled water block with Quick-Disconnect Couplings (QDC) typically drops flow rates from 150L/h to about 120L/h. Adding two such water blocks would result in flow rates of around 100L/h.

Flow rates of around 100L/h is considered adequate for efficient cooling of the modern high-power GPUs.



**NOTE:** To achieve the best performance it is highly recommended to run pump at full speed when expanding the Phoenix unit with additional water blocks. Please consult page 32 of this manual.

## **Q** Is it possible to flip the fan orientation?

A: Yes, however this requires cutting of the zip-ties holding the cables together. The fans can be removed by the use of enclosed Allen key (2.5mm). When flipping the fan orientation it is crucial to keep the zip ties in place (which function as a washer as well), otherwise the fan screws might pierce and thus irreparably damage the radiator core.

Such damage is not covered by warranty.

## **Q** Is it possible to 'daisy-chain' the integrated PWM splitter?

A: Yes, the integrated PWM splitter allows for daisy-chaining of additional PWM splitter cables, such as EK-Cable y-Splitter 2-Fan PWM (10cm) [EAN: 3831109867860], as long as the total power draw does not exceed 25W (2A on +12VDC) - the limit of SATA power connector of the Phoenix unit.

## **Q** Is it possible to add additional radiators (daisy-chain) to the Phoenix loop?

A: It is possible, although not recommended, because the pump may have some problems sending the fluid around the expanded system.

## Q What thermal performance is to be expected from the Phoenix unit?

A: The nominal cooling capacity of the Phoenix units is listed in the table below:

|                | dT=10K | dT=15K |
|----------------|--------|--------|
| Phoenix 240 *  | 287W   | 430W   |
| Phoenix 360 *  | 425W   | 637W   |
| Phoenix 140 ** | 179W   | 269W   |
| Phoenix 280 ** | 358W   | 537W   |

\* = Vardar 120 @ 1850rpm

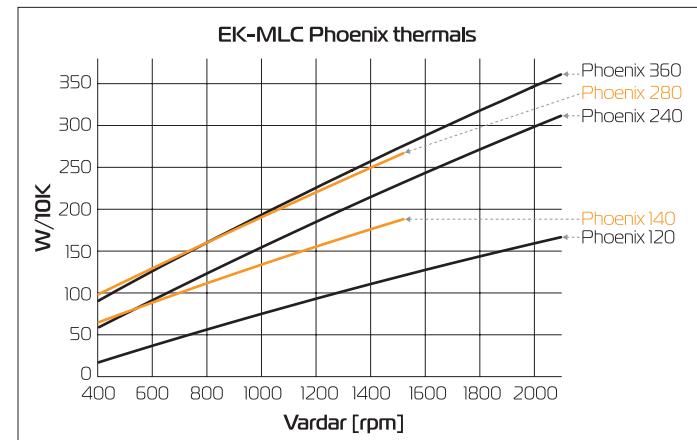
\*\* = Vardar 140 @ 1500rpm

The nominal capacity tells how much heat is the Phoenix unit able to move with 10°C (10K) or 15°C (15K) increase in liquid temperature over ambient.

Example: Ideally, the Phoenix 140, cooling an overclocked LGA-1151 Skylake Core i7 CPU (150W) and the Nvidia GeForce GTX 1080 class GPU (225W) would achieve liquid temperatures of about 21°C above ambient during maximum combined (synthetic) workload. given the ambient temperature of 22°C, this would result in liquid temperature of around 43°C in ideal situation. One can usually expect 10-15°C higher GPU core temperature (GPU 53-58°C).



The same formula works for majority of hardware as long as the correct TDP value is used.



# TROUBLESHOOTING

## IN CASE OF CPU OVERHEATING

Very high CPU temperatures are usually the symptoms of malfunctioning liquid cooling loop, assuming the contact between CPU heat spreader and water block itself is good and that the water itself is adequately cooled within the radiator. This can occur either due to:

**1. Malfunctioning or non-working water pump:** The symptoms usually include rapid spike in temperature when stressing your CPU to the maximum (for example with Prime95 software). Make sure the pump is plugged in to the power connector and that the liquid is indeed flowing in your system. You should feel the pump vibrating in your hand. Observe the flow indicator or flow meter reading if present. »The PWR GOOD LED indicator on the PWM splitter should glow red when working. No light means no power is getting through – please check electrical connections.

**2. Malfunctioning or non-working cooling fans:** TThe symptoms usually include rapid spike in temperature when stressing your CPU to the maximum, make sure the cooling fans are plugged in to the power connector hub and that the blades are indeed rotating. »The PWR GOOD LED indicator on the PWM splitter should glow red when working, no light means no power is getting through – please check electrical connections.

**3. Kink in the liquid cooling tubing:** Very similar symptoms to both above described. Thin-walled tubing may collapse easily under low radius turns or when obstructed by other computer chassis elements such as closing side panel doors. Check the tubing for any signs of kink which restrict the flow. This is normally not the case when using original tubing.

**4. Clogged microchannels in the water block:** Clogged microchannels in the water block: microchannels can get clogged easily with various dirt particles and impurities, especially with plasticizer powder which has leached from the tubing (When using unsafe liquid cooling tubing). The symptoms usually include rapid spike in temperature when stressing your

CPU to the maximum, flow rates are very low. Visually inspect the water block internals for any buildup or contamination and clean the system if necessary. In case the water block with translucent acrylic top is employed this inspection can be done without disassembling the system.

**5. Thermal interface material (paste/grease) not applied or applied improperly:** Lack of - or even too much TIM - may result in CPU overheating. Please refer to STEP 2 in INSTALLING THE WATER BLOCK section.

Another culprit could be partially or completely defective CPU. Some CPUs run at higher temperatures than the others. Overheating of the CPU can also occur due to:

**1. Poor thermal contact within the CPU itself:** Some CPUs, such as Intel LGA-1151 socket based Skylake, Intel LGA-1150 based Haswell and older, socket LGA-1155 based Ivy Bridge are notorious for their poor thermal contact between the CPU die and the heat spreader (IHS) itself due to the use of poor TIM. This is the problem of the processor and not the Phoenix CPU liquid cooling unit. These CPUs are known to run very hot (80°C+) even on factory set frequencies. For best performance it is usually recommended to replace the TIM between the die and the IHS or to even run the processor de-lidded. Both require hazardous IHS removal which voids processor's warranty but can lead to temperature decrease of 30°C and higher.



EKWB deems der8auer Delid Die Mate tool safe to be used by experts for de-lidding of the Intel Skylake CPUs.



Upon exhausting all options please consult EK knowledge base at <http://support.ekwb.com>. Raise a question through EK Support ticketing system if needed.

## THE COOLER IS TOO LOUD

The Phoenix unit is equipped with fast-spinning EK-Vardar high-static pressure PWM controlled fans, which run at very high speed if the UEFI/BIOS is not set to control fan speed. make sure to set control mode to PWM (instead of DC)! On majority of motherboards this feature can be found in 'Hardware monitoring' section of the UEFI/BIOS. Please consult your motherboard manual on how change fan speed.

### General ASUS Z170/X99 motherboard guide:

1. Enter UEFI and go to QFAN Control
2. Select the FAN header you wish to edit (the one that you have connected the Phoenix's PWM cable to)
3. Select PWM mode (instead of DC)

### General ASRock Z170/X99 motherboard guide:

1. Enter UEFI and go to H/W Monitor
2. Choose the FAN header you wish to edit (the one that you have connected the Phoenix's PWM cable to)
3. Change from 'Full Speed' to 'Silent', 'Standard' or 'Performance' mode

### General Gigabyte Z170/X99 motherboard guide:

1. Enter UEFI and go to M.I.T. -> PC Health Status
2. Select (CPU Fan) Speed Control optionbox and select 'Auto', 'Normal' or 'Manual'.

### General MSI Z170/X99 motherboard guide:

1. Enter UEFI and go to Hardware Monitor
2. Select the FAN header you wish to edit (the one that you have connected the Phoenix's PWM cable to)
3. Enable Smart Fan Mode Checkbox
4. Change ramp-up curve by dragging and dropping 4 coloured squares



Make sure the 4-pin PWM Fan connector is indeed plugged in correctly into the appropriate FAN header on your motherboard. Please consult page 10, chapter Connecting the hub to the motherboard.

## GENERAL LIQUID COOLING PARTS CLEANING GUIDE



Liquid cooling parts may be disassembled for cleaning purposes on an occasional basis. your warranty is not voided on disassembly of the water block but the customer loses the EK leak-free guarantee which comes with a factory tested component. And old, but soft toothbrush is an excellent cleaning tool!

### 1. Cleaning bare copper:

When cleaning bare copper is it recommended to use slightly acidic cleaning agents which include the following organic agents:

- (white) vinegar (acetic acid up to 5-10%)
- lemon juice (citric acid up to 5-10%)

Certain food can also be used for cleaning copper:

- cola (contains phosphorous- and citric acid)
- ketchup or tomato extract (contains acetic- and citric acid)
- mustard (contains acetic acid)



5% vinegar, diluted with 95% water is enough to kill 99.9% of algae and bacteria that could be present on copper in an unmaintained cooling loop as well.

Upon cleaning is it necessary to flush the water blocks in water and rinse them with distilled water. After rinsing we recommend soaking the water blocks in paper towels until completely dry. It is nearly impossible to avoid the naturally occurring copper tarnishing (oxidation) as the oxidation will reoccur the moment the copper is cleaned of the all oxides.

**2. Cleaning nickel plated copper:** When cleaning nickel plated copper it is forbidden to use any aggressive chemicals (neither vinegar) or rough materials as you may damage the plating and thus void the warranty. Please note also that due to presence of dye additives and other chemicals the nickel layer may also become discolored/stained over time period. However the staining is normally reversible by simple flush and rinse. Cleaning the nickel plated copper should consists of these steps:

- flush the nickel plated copper under warm water
- clean the surface using wet non-abrasive cloth and rinse with clean water
- polish the hardened deposits (such as algae or dirt) from the nickel plated copper if necessary.

EK recommends the use of automotive soft, non-abrasive metal polish creams. After you finish using other cleaning methods, give the nickel plating a good polish with a non-abrasive metal or chrome polish. Apply a small amount of polish to a cloth or to the surface of the nickel. Wipe the entire surface of the nickel with the polish, using small circular motions, until it looks shiny and clean. Use another clean cloth to remove the remains of the polishing paste from the surface. Always rinse with distilled water after you are done with polishing.

### 3. Cleaning acrylic (plexi) glass tops:



Acrylic will fail prematurely if subjected to even small amounts of alcohol, acetone or other aggressive chemicals.

Please do not use anything but warm, soapy water and a toothbrush to clean the acrylic (plexi) glass water block tops and reservoir tubes. Using aggressive chemicals will surely void your warranty!



Algae- or dirt deposits may be rubbed out using soft cloth in combination with warm, soapy water. Rinse with distilled water after cleaning.

**4. Cleaning POM (acetal) tops:** POM (polyoxymethylene) or Acetal can withstand chemicals such as alcohol or acetone but EK recommend to use these very sparingly as the drying chemicals will surely leave some residue. Usually the POM can be cleaned easily just be the use of soft cloth and warm, soapy water - without the use of any chemicals. Rinse with distilled water after cleaning.

## PREVENTIVE STEPS

**1. Using corrosion inhibiting coolant** (such as EK-CryoFuel or other market proven coolant) is highly recommended for any water cooling loops. Since EK-CryoFuel is also a surfactant it will prevent algae growth and dirt deposition on all wetted surfaces.

**2. Refrain from using** Copper Sulphate based additives in your loop in order to prevent tarnishing on your water cooling gear internals!

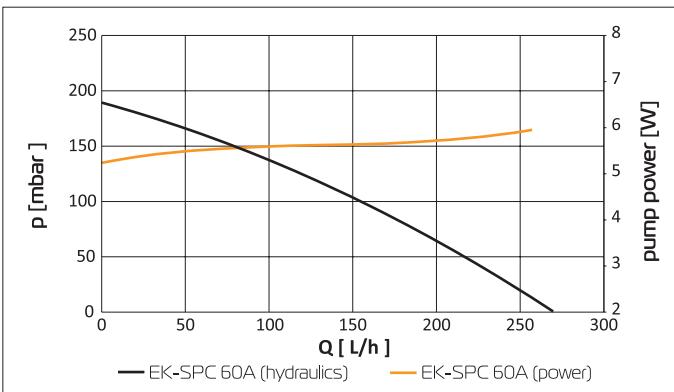
## PUMP

|                    | <b>EK-SPC 60A</b>        |
|--------------------|--------------------------|
| Pump Type          | DC centrifugal Pump      |
| Bearing Type       | Ceramic Bearing Ball     |
| Rated Voltage      | 12V DC                   |
| Operating voltage  | 8*-13,2 VDC *9v starting |
| Pump RPM           | 2500 RPM                 |
| Dimensions (LxWxH) | 61,5x61,5x17,5 mm        |
| Life Expectancy    | >50 000 h                |
| Max head of pump   | 1,9 m                    |

### Operating environment

Ambient temperature ..... 10-50°C

Fluid temperature(coolant).....10-60°C



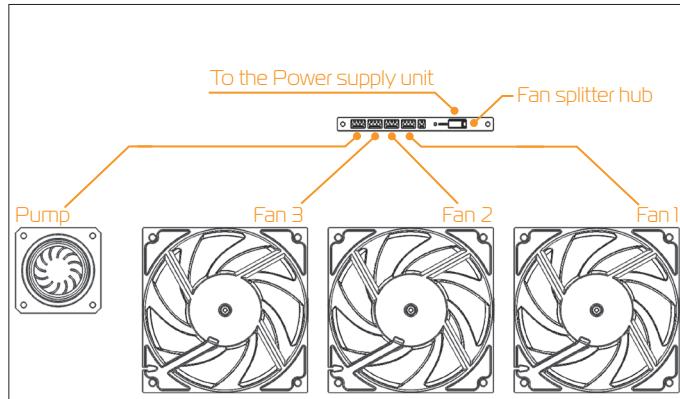
## FAN SPLITTER HUB

All the elements that need electricity to run are connected to the **fan splitter hub**, located on the back of the unit.



This fan splitter hub contains three 4-pin PWM Fan headers for three fans and one pump.

A two-pin header is used to connect Phoenix unit to motherboard CPU Fan header in order to allow for speed regulation of fans and pump. 2-pin PCI-express miniFIT power header is used to provide power to Phoenix unit.



### **General characteristics:**

- 3x 4-pin PWM fan header (Molex KK 254 standard)
- 1x 4-pin PWM pump header (Molex KK 254 standard)
- 1x 2-pin tacho/PWM header (Molex KK 254 standard)
- 1x 2-pin power header (Molex miniFIT standard)
- 1x Power LED indicator diode (red) - rectified PWM input
- Uniform PWM control on all headers

### **Connecting the pump directly to motherboard fan header (OPTIONAL)**

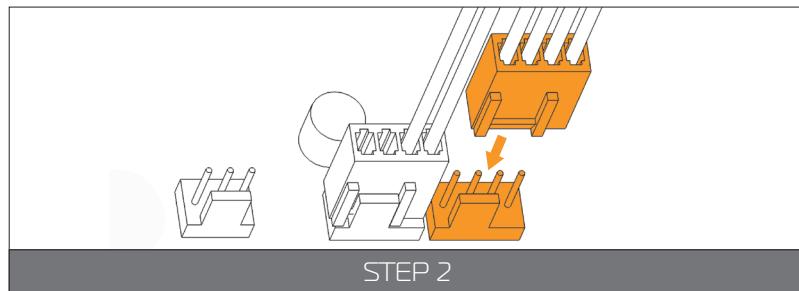
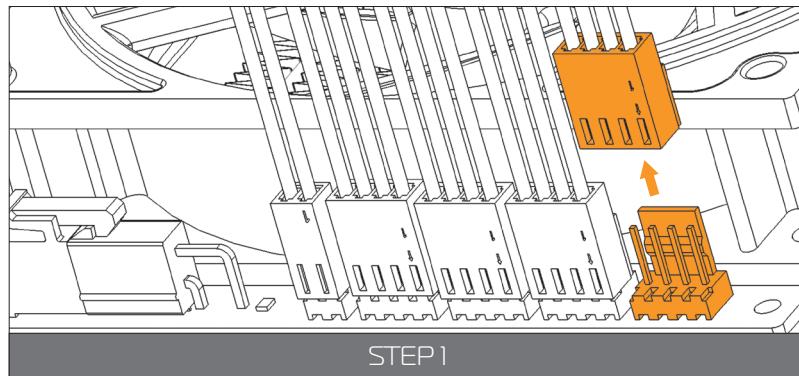
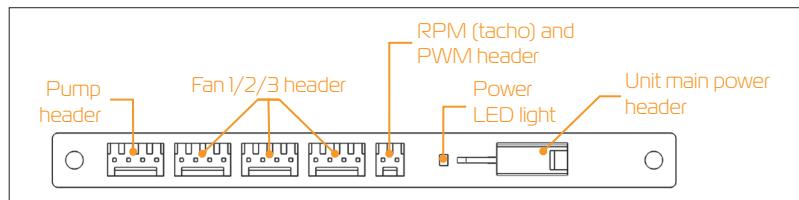
If you want to control the speed of the pump and the fans separately you should follow the steps below:

#### **STEP 1:**

Disconnect the pump's cable from the fan splitter hub. you will need to remove cable ties in order to do so.

#### **STEP 2:**

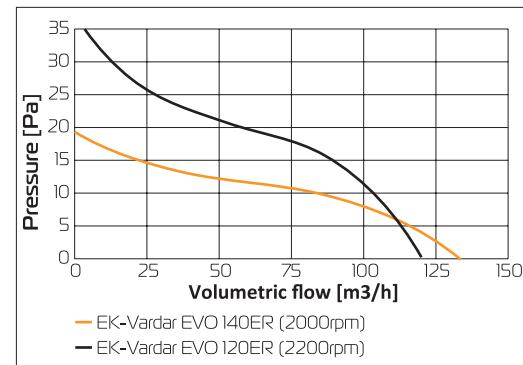
Connect the pump's connector to the CPU fan header (preferably) on the motherboard.



## FANS

|                 | EK-Vardar EVO 120ER      | EK-Vardar EVO 140ER      |
|-----------------|--------------------------|--------------------------|
| Fan type        | PWM                      | PWM                      |
| Rated Voltage   | 12V DC                   | 12V DC                   |
| Power Draw      | 2.16W                    | 3.86W                    |
| Max Air Flow    | 77 CFM = 131 m³/h        | 108 CFM = 184 m³/h       |
| Static Pressure | 3.16mm H2O = 31 Pa       | 3.15 mm H2O = 30.9 Pa    |
| Noise Level     | 33.5 dBA                 | 40.7 dBA                 |
| Max speed       | 2200 rpm (+/- 10%)       | 2000 rpm (+/- 10%)       |
| Life Expectancy | 50.000 hrs @ 40°C (MTBF) | 50.000 hrs @ 40°C (MTBF) |
| Dimensions      | 120 x 120 x 25 mm        | 140 x 140 x 25 mm        |

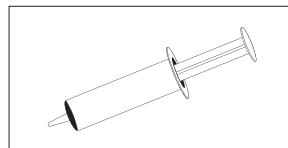
It is normal for the EK-Vardar EVO fan to stop spinning at low workload and during PC idling.



## THERMAL GREASE

### Thermal Grizzly Hydronaut

|                                  |               |
|----------------------------------|---------------|
| Type .....                       | Low Viscosity |
| Electrically conductive.....     | No            |
| Optimal working temperature..... | +100 to -50°C |
| Thermal conductivity.....        | 11,8 W/mK     |
| Density.....                     | 2,6 g/cm³     |



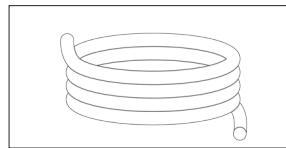
Purchase spare thermal grease here:



## TUBING

### EK-Tube ZMT Matte Black 15,9/9,5mm

|                                  |                          |
|----------------------------------|--------------------------|
| Material.....                    | EPDM                     |
| Color .....                      | Black, not UV-reactive   |
| Operating temperature range..... | -30°C to 110°C           |
| Dimensions.....                  | 9,5 mm / 15,9 mm (ID/OD) |



Purchase spare tubing here:



## SUPPORT AND SERVICE

For assistance please contact:  
<http://support.ekwb.com/>

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