Control unit

aquaduct

User's manual

Firmware version 1.05
OS version 2.00

Current as of: May 2009

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Aqua Computer GmbH & Co. KG
Gelliehäuser Str. 1, 37130 Gleichen, Germany

Aqua Computer GmbH & Co. KG
Gelliehäuser Str. 1, 37130 Gleichen, Germany

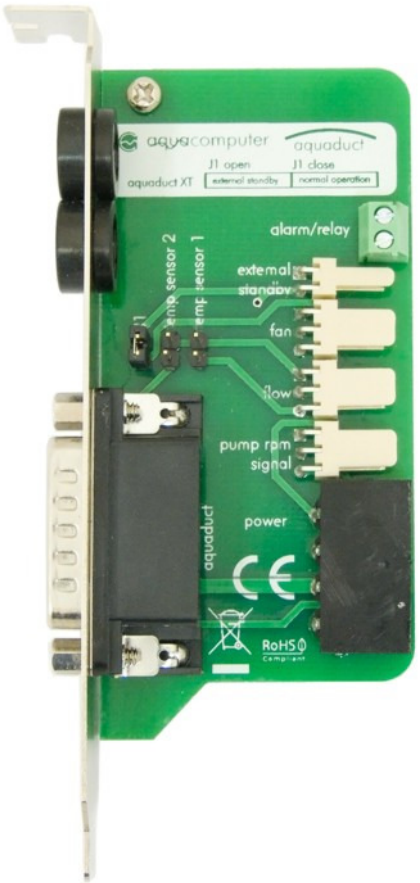
1. Preface

This manual complements the "Operating and installation manual" for the model aquaduct 360 XT mark III and aquaduct 720 XT mark III. Strictly observe the safety precaution and care instructions included in that manual!
Considering the fast technical development, we reserve the right to be able to perform alterations to the products at any time. It therefore is possible that your product does not correspond precisely to the descriptions or especially the illustrations in this manual.

2. Connecting external components

2.1. "power"

Power supply connector. Attach a vacant power connector of your PSU. Due to the form of the plug the polarity can not be misinterpreted. Do not use force when connecting the plug but double check if the plug is lined-up correctly (i.e. not upside down).



2.2. "pump rpm signal"

The aquaduct control unit can be configured to supply a generic rpm signal. This rpm signal can be configured to be switched off in case of an error and therefore allows for an extended error management. If this connector is connected to the CPU fan connector of the motherboard of your PC, depending on the BIOS an emergency shutdown function can be realised. For detail on BIOS setup, please consult the manual of your motherboard.

2.3. "flow"

This connector must not be used as the aquaduct 360/720 XT features an integrated flow sensor!

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2.4. "fan"

Power supply connector for a fan, allowing rpm signal detection.
Attention: Max. load 5 Watts!
Pin assignment: Pin 1: GND
Pin 2: 0-12 V
Pin 3: rpm

2.5. "external standby"

Connection possibility for an additional power supply via the 5 V standby strand of the PSU. In this case the aquaduct stays active even if the computer has been shut down (Soft-Off). When using external standby power, take care to check the Jumper J1 for correct setting!
Only use cables specified by aqua-computer (not included in delivery)!
Pin assignment: Pin 1: GND
Pin 2: +5V Standby

2.6. "alarm/relay"

This floating breaking contact can be used for advanced security functionns, for example emergency shutdown functions on alarm condition. For using these functions, additional accessories (not included in delivery) may be necessary. For using the emercency shutdown functions, we recommend using the accessory article "aquaero power connect - 24 pin ATX standby power / ATX break" (order code 53047).
Pin assignment: Pin 1-2: breaking contact
Maximum breaking capacity: 1 A at max. 12 V.

2.7. "J1" power supply jumper

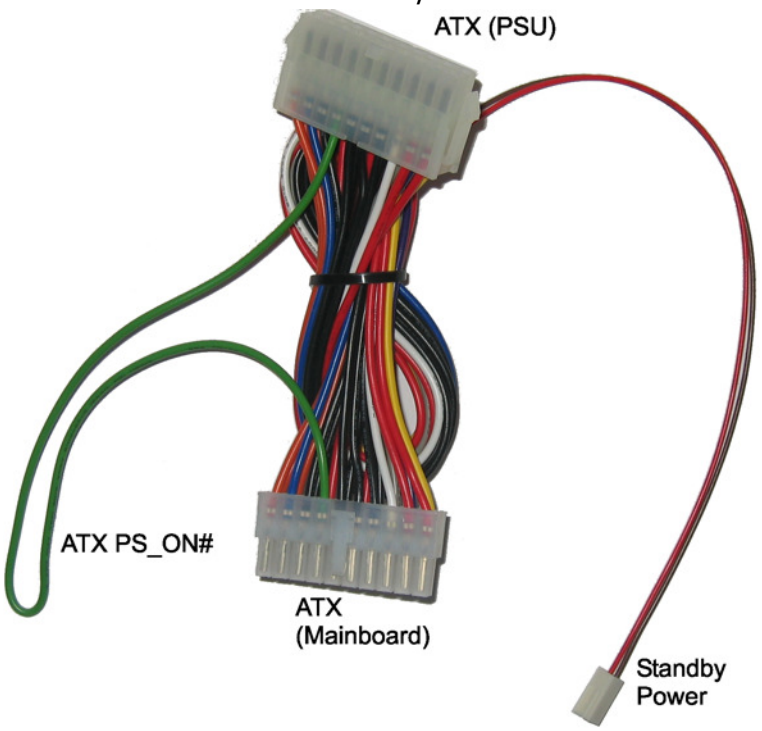
This jumper determines whether the control unit of the aquaduct is powered from the power supply connector (see 2.1. "power" for details) or from the external standby connector (see 2.5. "external standby" for details). Factory setting is power supply connector.
When using standby power, this jumper must imperatively be removed!
Jumper setting: closed: standard power supply
open: standby power supply

2.8. „temp sensor 1/2“

Connection possibility for two additional temperature sensors (10 kΩ NTC). Sensors are not included in delivery.

2.9. aquaero power connect (optional accessory)

The following picture shows the possible connections of the “aquaero power connect“ cable. The standby power supply is to be connected to the appropriate connector of the aquaduct. The green ATX PS_ON# line can be cut through and connected to the “relay” connector of the aquaduct. If you want to use the relay outlet for connection to the power switch line of the motherboard, the ATX PS_ON# line must remain intact! For correct operation, the cable has to be connected to the power supply ATX connector and to the ATX connector of the motherboard as well.



3. Initial operation

After all connections to the PC interface circuit board have been established as described in chapter 2, you can put the aquaduct to operation following the instructions of the operating and assembly manual, chapter 10.

After switching on the computer, the aquaduct will show a greeting screen with information on the firmware revision before it continues on to the status of the fans and sensors.

You should now familiarize yourself with the functions of the device before you perform the setup of the basic settings.

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4. Display and operation

4.1. Function of the input knob

The aquaduct 360/720 XT mark III features a rotary knob with push function. Using this knob, all functions of the aquaduct can be accessed and configured. Using the USB interface and the included software is not necessary but simplifies the setup.
Depending on the current display the rotary knob has the following functions:

Rotary motion:	Previous/next menu option/screen
	Decrease/increase chosen value
Push:	Call menu
	Select menu
	Confirm value

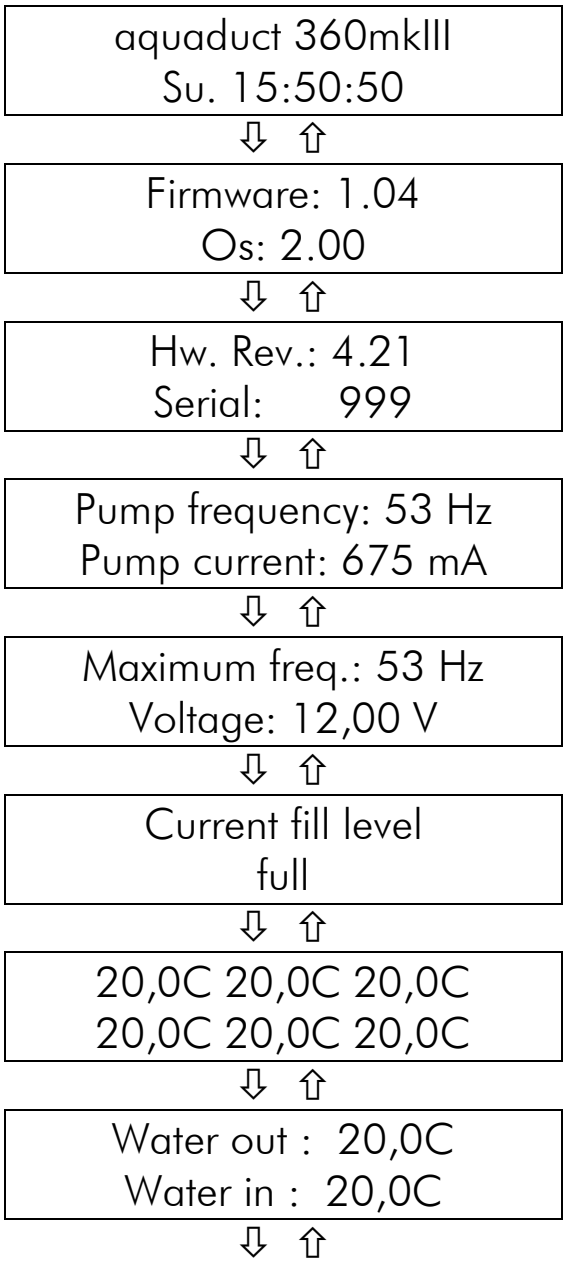
4.2. Override function for quick efficiency adjustment

For quick adjustment of the cooling efficiency, the aquaduct 360/720 XT mark III features a configurable override function to adjust all important control parameters just with one single movement of the rotary knob. To change the override setting, simultaneously push and turn the rotary knob.
First value: Shifting of target temperatures
The first value is the target temperature shift in °C. A value of "-5,0 °C" for instance means that a sensor configured to have a target temperature of 35,0 °C will effectively be interpreted as a target temperature of 30,0 °C.
Prerequisites: The override function is enabled for the respective sensor and the fan(s) assigned to this sensor are configured to target temperature mode, linear or progressive mode.
Range of adjustment: -10,0 °C to +10,0 °C
Second value: Shifting of fan output power
The second value is the fan output power shift or rotation speed shift respectively in percent. A value of "+20 %" for instance means that a fan configured to run at 50% will effectively be powered by 70 %.
Prerequisites: The respective fan is configured to manual power configuration or in fixed rpm mode and the override function is enabled.

Range of adjustment: -39 % to +39 %

4.3. Display mode

During normal operation, time, fan data, temperatures and flow data are displayed consecutively. Turning the rotary knob will step forward or backwards through the screens, the display can also be configured to switch to the next screen after a variable time span.
You can add or remove single screens as well as define sensor names freely, which is the reason why your screens may vary from the illustrations in this manual.
Following screens will be shown one after the other:



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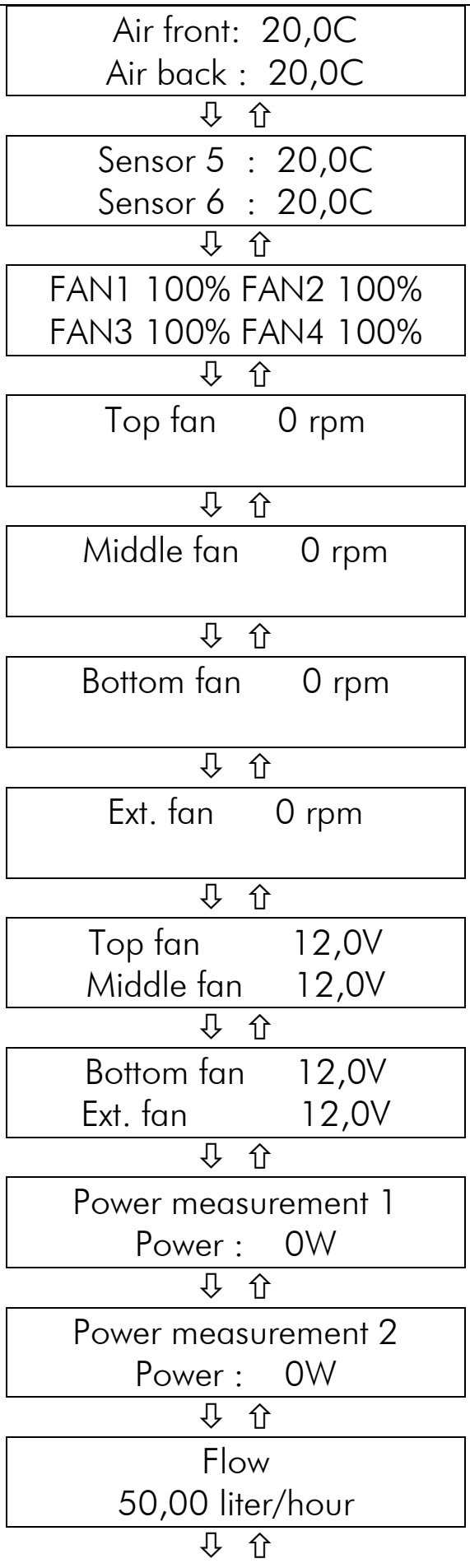
Air front: 20,0C
Air back : 20,0C
Sensor 5 : 20,0C
Sensor 6 : 20,0C
FAN1 100% FAN2 100%
FAN3 100% FAN4 100%
Top fan 0 rpm
Middle fan 0 rpm
Bottom fan 0 rpm
Ext. fan 0 rpm
Top fan 12,0V
Middle fan 12,0V
Bottom fan 12,0V
Ext. fan 12,0V
Power measurement 1
Power : 0W
Power measurement 2
Power : 0W
Flow
50,00 liter/hour

** Override **
- 0,0 C + 0 %

⇩ ⇧

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5. Device settings

5.1. Basic operation

In the normal display operation, you can enter the configuration menu by pushing the rotary knob. In the configuration menu, you can select individual entries by turning the rotary knob and then pushing the knob.

5.1.1. Definition of names

The aquaduct allows you to change all sensor and fan names. After selecting a corresponding menu entry the current sensor name is shown and a underscore marks the first character. By turning the rotary knob, the first character can be changed. The characters appear in the following order: capital letters, lower case letters, space, and numbers. By selecting the character "←", the cursor jumps back to the previous position.
After confirming your selection by pressing the rotary knob, the cursor will move on to the next character. Repeat the procedure for all characters. After confirming the last character, the aquaduct will show the menu again.
All sensor names have a predefined length. If you would like to use shorter names, you have to fill the free signs with spaces.

5.1.2. Principle of assigning sensors to fans

As a basic principle, fan regulation parameters such as minimum/maximum temperature and target temperature are defined for each temperature sensor, not for the fans. This means that you will have to configure the temperature sensor first and then assign this configured sensor to one ore more fans.
One or two temperature sensors can be assigned to each fan, alternatively each fan can also be manually controlled.

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5.2. Settings menu

In display mode, the settings menu can be called by pressing the rotary knob. The following submenus can then be called:

5.2.1. → Temperature sensors

Calls the submenu to configure the six temperature sensors. For details, see 6. Menu „Temperature sensors“

5.2.2. → Flow sensor

Calls the submenu to configure the flow sensor. For details, see 7. Menu „Flow sensor“

5.2.3. → Fan parameters

Calls the submenu to configure the four fan outputs. For details, see 8. Menu „Fans“

5.2.4. → Pump parameters

Calls the submenu to configure the integrated pump. For details, see 9. Menu „Pump“

5.2.5. → Display parameters

Calls the submenu to configure the integrated LC display. For details, see 10. Menu „Display“

5.2.6. → Relay parameters

Calls the submenu to configure the potential free relay contact, for instance to configure emergency shutdown functions. These functions may require additional accessories which are not included in delivery as well as the integration of the relay connectors into the ATX control line of the PSU or connection to the power switch header of the motherboard. For details, see 11. Menu „Relay“

5.2.7. → Alarm parameters

Calls the submenu to configure the alarm settings. For details, see 12. Mena „Alarms“

5.2.8. → LED parameters

Calls the submenu to configure the integrated LEDs. For details, see 13. Menu „Illumination“

5.2.9. → Clock and timer

Calls the submenu to set the clock and configure the timer. For details, see 14. Menu „Clock and Timer“

5.2.10. → Power measurement

Calls the submenu to configure power measurement functions. For details, see 15. Menu „Power measurement“

5.2.11. → Fill level measurement

Calls the submenu to configure the fill level measurement. For details, see 16. Menu „Fill level “

5.2.12. → Factory defaults

Calls the submenu to reload factory defaults. For details, see 17. Menu „Factory defaults“

5.2.13. Return to display

Leaves the menu and returns to normal display mode.

6. Menu „Temperature sensors“

Select one of the six temperature sensors from the list by turning the rotary knob and confirm your selection by pushing the knob.
To leave the menu "temperature sensors", choose the entry "back" and confirm the selection by pushing the knob.

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6.1. Sensor name

Enter the name of the sensor that should be shown on the display. After the selection of this menu entry, the current sensor name is shown and can be changed. See also 5.1.1. Definition of names.

6.2. Start-up temperature

Enter the temperature in °C here, at which an assigned fan should start. Below this temperature, an assigned fan is turned off.
If the option "Minimum Power" is activated, the fan will not be shut down when the temperature drops below the start-up temp. In this case the minimum power is held constantly.

6.3. Maximum temperature

Enter the temperature in °C here, at which the assigned fan should run on max. power. Above this temperature, the assigned fan continues to run at maximum speed.

6.4. Alarm temperature

Enter the temperature in °C here, at which the alarm should be activated. Additionally, alarm evaluation must be activated for this alarm, for details see 12.1. Alarm.

6.5. Hysteresis

Depending on the set regulator option this parameter has the following effect on the regulated fan:
Regulator option "linear" or "progressive":
Simply put, the hysteresis is the difference between the start-up and shutdown temperature for the fans. A frequent start-up and shutdown of the fans is therefore prevented if the current temperature fluctuates around the start-up temperature. Should the fans be turned on and off in short intervals you should increase this value.
Regulator option "target value":
If the fan is regulated via the target temperature, the hysteresis defines the tolerable temperature aberration, meaning that the fan speed will not be adjusted as long as the temperature does not differ from the target temperature more than the hysteresis value.

If for instance a target value of 35 °C and a hysteresis of 1 °C is set, then the rpm of the fan is only adjusted when the temperature rises above 36°C or drops below 34 °C.
Adjustable in 0,5 °C steps from 0,0 °C to 25,0 °C. Default setting is 2,0 °C for „Water in“ and 1,0 °C for all other sensors.

6.6. Target temperature

Enter the temperature in °C here, at which the fan should become active. The assigned fan will be switched on and, if technically possible, will regulate a constant target temperature. If the temperature drops below the target temperature, the fan is slowed down.
The fan will not be shut down even if the current temperature is below the set target temperature if the option “hold minimum power” is enabled.
Adjustable in 0,5 °C - steps from 0,0 °C to 100,0 °C. Default setting is 35,0 °C.

6.7. Calibration offset

Professional function to calibrate the temperature sensors. Standard value is zero and should not be altered in the normal case. An adjustment may become necessary if sensors of other manufacturers are used. Internal formula for the temperature calculation, see 6.8. Calibration factor.

6.8. Calibration factor

Professional function to calibrate the temperature sensors. Standard value is zero and should not be altered in the normal case. An adjustment may become necessary if sensors of other manufacturers are used. The internally used formula to calculate the temperature is:
237+Offset-(44,15-Factor)*ln(measured value) (Output is value in °C)

6.9. Controller delay

This value is only needed if the corresponding fan is in the target-value mode.
The controller delay sets the minimum time in seconds after which the controller is recalculated.

The higher this time, the slower the temperature regulator reacts to changes in temperature which means that the corresponding fan adjusts the rpm slowly. For instance when regulating an inert system like the water temperature in a cooling system, it would be useful to set this value to approx. 20 seconds.
This value mainly determines the regulatory behavior at small temperature differences; at larger temperature differences, the effect from the regulator factor becomes ostensible.
Default value is 20 seconds for "Water in" and 3 seconds for all other sensors.

6.10. Controller factor

This value is only needed if the corresponding fan is in the target-value mode.
The regulator factor is a multiplier for the temperature difference of the target-value and causes an immediate adjustment of the rpm of the corresponding fan.
The higher this value, the stronger the temperature regulator reacts to differences in the target value.
Default value is 2.

6.11. Override on/off

Enables/disables the override function for this temperature sensor.

6.12. Back

Leaves the submenu and returns to sensor selection.

7. Menu „Flow sensor"

7.1. Alarm level

If the current flow rate drops below this value, an alarm will be raised. Additionally, alarm evaluation must be activated for this alarm, for details see 12.1. Alarm.

7.2. Calibration factor

Enter the impulses generated by the sensor per liter. Default value is 256 Imp/l.

7.3. Back

Leaves the submenu and returns to "Settings".

8. Menu „Fans“

Select one of the four fan channels from the list by turning the rotary knob and confirm your selection by pushing the knob.
To leave the menu "temperature sensors", choose the entry "back" and confirm the selection by pushing the knob.
Generally, the last used control mode is always used, either control via temperature sensors, revolution speed or manual control. The entered values are not lost when the operating mode is switched but are saved for the next call.

8.1. Sensor 1 (auto)

Activates the control by temperature sensors and assigns the selected fan one of the temperature sensors one to six or no sensor at all. If two different sensors are assigned, the sensor that causes a higher fan speed is used.

8.2. Sensor 2 (auto)

Activates the control by temperature sensors and assigns the selected fan one of the temperature sensors one to six or no sensor at all. If two different sensors are assigned, the sensor that causes a higher fan speed is used.

8.3. Set rpm

Activates the fan control via revolution speed and allows defining the fan speed. The fan can either be turned off (0 revolutions) or regulated in the area from approximately ¼ of the maximum speed to the maxi-

mum speed in steps of 50 rpm/s. The maximum speed for each connected fan is determined automatically when the system is started. If the connected fan does not generate any speedometer signal, the selection is deactivated. If you connect fans during operation, you can let the aquaduct determine the parameters again, see 8.5. Get maximum rpm. When activated, the aquaduct regulates the fan after the speedometer signal has been reported back and adjusts the power output load-dependently. Only when the entered speed can not be reached even at max power, the fan will slow down.

8.4. Manual control

Activates the manual fan control and allows the adjustment of a constant power output. The entered value is represented by a graphical bar.

8.5. Get maximum rpm

Reinitializes the aquaduct and determines the maximum speed of the connected fan for the selected fan canal if the fan generates a speedometer signal.

8.6. Calibration factor

Depending on the fans used, you can enter the impulses generated by the fan per revolution. For most fans used in a PC, the value should be two impulses per revolution. Default value is 2 imp/rev. and in most cases should not be changed.

8.7. Maximum power

Here, you can define the maximum power output of the fan in percent. By reducing this value, you can reduce the maximum noise created by the fans, but naturally you will also decrease the maximum cooling performance! Therefore use this value with extreme caution! Default value is 100 %.

8.8. Minimum power

Here, you can define the minimal output performance of the temperature-controlled operation. This value is processed differently depending

on the implemented fan. If the fan generates a speedometer-signal this value represents the minimum rpm (percentage-value) of the determined maximum rpm. If the fan does not generate a speedometer signal, this value defines the minimum output power in percent. If you use a fan without a speedometer signal you should determine the minimum value, via the “manual regulation”, at which the fan is guaranteed to start and use this value as the “minimal output” for the fan. Default value is 35 %.

8.9. Control options

Allows the switching between a linear and a progressive speed-curve in the temperature-controlled operation or activates regulation via a target-temperature.
"Linear" and "progressive": linear means that the fan is regulated proportionally between the start-up temperature and the full load temperature, while at progressive regulation the speed-curve is dependent on the temperature. With climbing temperatures the speed-curve begins shallow but climbs steeper as the full load temperature is reached.
Opposite to the linear regulation, the fan performance in progressive regulation is mobilized only in the upper temperature area and a quieter operating sound is made possible at a lower heat load. However at higher temperatures the full load of the fans is still reached rather quickly.
Sensor parameters used: "start-up threshold", "full load threshold" and "hysteresis"
"Fixed": the fan is regulated so that the target temperature is held constant if possible. For this purpose the sensor parameter "target temperature" is used.
Sensor parameters used: "start-up threshold", "full load threshold", “controller delay”, “controller factor” and "hysteresis"

8.10. Use rpm signal

Here you can adjust whether the fan is regulated via the rpm-signal („active“) or via the output power („inactive“).
When connecting a fan to the external fan connector of the PC interface board, please note that not all fans generate a rpm signal and deactivate this option if the fan does not provide a rpm signal. With some fans

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the speedometer signal degenerates at a low power output and thus cannot be processed by the aquaduct. In this case you should deactivate this function to regulate the fan independently of the quality of the speedometer signal.

8.11. Override on/off

Enables/disables the override function for this fan channel.

8.12. Hold minimum power

By activating this function the fan output is operated at at least the minimum power in the modes „linear“, „progressive“ and „target value“ even if the temperature is below the minimum or target value.

8.13. Back

Leaves the submenu and returns to the fan selection.

9. Menu „Pump“

9.1. Auto mode on/off

This setting determines whether the pump is set to a manually defined rotation speed (setting „Manual Frequency“) or will automatically determine its maximum rotation speed and run at this speed (setting „Automatic frequency“). Maximum rotation speed varies depending on flow resistance of the cooling system.

9.2. Minimum frequency on/off

When activated, the pump will automatically restart if the set value for minimum frequency cannot be met during start-up of the pump.

9.3. Minimum frequency

This value defines the minimum frequency equaling a minimum rotation speed for the pump. This value is only processed if “minimum frequency on/off” is enabled.

9.4. Frequency preset

This value defines the frequency preset for the manual mode. In automatic mode, this setting is without effect.

9.5. Back

Leaves the submenu and returns to "Settings".

10. Menu „Display“

10.1. Brightness

Here you can adjust the brightness of the background illumination of the LCD-display. The value entered is represented by a graphical bar.

10.2. Contrast

Here you can adjust the contrast of the LCD-display. The value entered is represented by a graphical bar.

10.3. Minimum brightness

This setting defines the minimum brightness of the display. Display brightness will not drop below this value, even if the display is turned “off”. The value entered is represented by a graphical bar.

10.4. Turn-off time

Enter the time span after which the display illumination should be turned off after turning/pushing the rotary knob. Adjustable in 30-second-steps from 30 to 300 seconds, alternatively always on (value> 300).

10.5. Switch time

Enter the time span after which the display should automatically switch to the next screen. Adjustable in 1-30-second-steps from 1 to 240 seconds, alternatively no automatic switches (value> 240).

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10.6. LCD switch-off

If active, the display is completely shut off after the turn-off time and no text is visible.

10.7. USBLCD mode

Starts the USBLCD mode to output text via PC-software on the Display. To exit the USBLCD mode, push the rotary knob.

10.8. USBLCD at bootup

Here you can choose if the device should directly activate the USBLCD-Mode when booting. To leave the USBLCD-Mode, push the rotary knob.

10.9. Page setup

Here, you can en- or disable single screens shown in the display mode. These screens are:

- Sensor overview
- Sensors 1 and 2
- Sensors 3 and 4
- Sensors 5 and 6
- Fan overview
- Fan 1 Details
- Fan 2 Details
- Fan 3 Details
- Fan 4 Details
- Fan 1+2 voltage display
- Fan 3+4 voltage display
- Power measurement 1
- Power measurement 2
- Flow sensor
- User screen 1 (configurable from the aquasuite software)
- User screen 2 (configurable from the aquasuite software)
- User screen 3 (configurable from the aquasuite software)
- User screen 4 (configurable from the aquasuite software)
- Override function
- Aquaduct information page 1

- aquaduct information page 2
- aquaduct information page 3
- aquaduct information page 4
- Pump information page 1
- Pump information page 2
- Fill level

By selecting the entry "Back" you exit this menu entry. For details about the individual screens see 4.3. If all screens are deactivated, the start screen is shown permanently as is the case when the aquaduct is turned on.

10.10. Key click

This setting adjusts the volume of the key click. By setting this value to zero, you can turn the key click off completely.

10.11. Back

Leaves the submenu and returns to "Settings".

11. Menu „Relay“

This menu is used for the configuration of the relay function. This function requires further components (connecting cable for the relay output, where applicable a standby power supply) as well as the correct integration of the relay output into the ATX-control line of the PSU or into the connector of the power-button on the motherboard. Optimally configured, this function can effectively prevent hardware damages when one or more components fail even if the PC already crashed a long time ago and software solutions failed.

11.1. Relay auto mode

This setting determines, whether the relay is controlled automatically or manually. If the relay is to be used for emergency shutdown functions (additional accessories required), automatic mode must be enabled.

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11.2. Relay on/off

After selecting this menu entry, the current status of the relay is displayed and can be altered by turning the rotary knob. Confirm your selection by pushing the knob.
This manually set status of the relay can consecutively change again, for instance if an alarm situation should occur or the timer functions are used.
. If the relay is integrated into the ATX-control line of the PSU, this function might need to be executed to start the PC.

11.3. Relay usage

Here you can setup the relay according to how you want to use it. Depending on the setting the relay is addressed differently to shutdown the PC in case of an alarm-event. A correct setup in this menu is crucial for the emergency shutdown function of the PC! If the relay is connected to the power button connection on the motherboard please select "Power Button", with the integration into the ATX-control-line of the PSU please select "ATX-Break-Line".

11.4. Enable alarm

By using this setting, all emergency shutdown function can be globally enabled and disabled. If you select “No shutdown”, all further settings are ignored and the PC will under no circumstances be shut down. (Alarm monitoring by illumination and acoustic alarms will not be affected by this setting.)

11.5. Enable timer

By using this setting, all timer functions can be globally enabled and disabled. If you select “Timer disabled”, all further settings for the timer functions are ignored.

11.6. Back

Leaves the submenu and returns to "Settings".

12. Mena „Alarms“

This menu contains functions to configure the alarm settings of the aquaduct.

12.1. Alarm events

By configuring this option, you can define which events should be checked for alarm conditions. Possible settings are:

- Fan 1 alarm
- Fan 2 alarm
- Fan 3 alarm
- Fan 4 alarm
- Temperature alarm
- Flow alarm
- Pump alarm
- Pump electronic (internal temperature alarm)
- Fan electronic (internal temperature alarm)

By choosing the entry “Back”, you will leave the submenu.

12.2. Alarm-off timeout

Enter the time span for the advance warning between crossing an alarm threshold and turning off of the PC. Adjustable in 5-second-steps from 0 (immediate shutdown) to 180 seconds. Factory default is 10 seconds.

12.3. Alarm time

Here you can select how long the relay should be switched in the case of an alarm. A correct setup in this menu is crucial for the emergency shutdown function of the PC! If the relay is connected to the power button connection on the motherboard please select a value of at least four seconds (default setting is 8 seconds).

12.4. Alarm beeper

This setting enables/disables the acoustic alarm function of the aquaduct

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12.5. Rpm signal on/off

This setting determines whether a generic rpm signal is to be generated by the aquaduct. By connecting the rpm signal connect of the PC interface circuit board to a vacant fan connector of the motherboard, BIOS functions can be used for alarm processing. The following two menu entries further configure the rpm signal.

12.6. Rpm signal on alarm

This setting defines whether the rpm signal is switched off in case of an alarm.

12.7. Rpm signal speed

Use this setting to configure the desired speed of the generic rpm signal. Range of adjustment: 400 to 5000 rpm.

12.8. Back

Leaves the submenu and returns to "Settings".

13. Menu „Illumination“

Select one of the two LEDs from the list by turning the rotary knob and confirm your selection by pushing the knob.
To leave the menu "Illumination", choose the entry "back" and confirm the selection by pushing the knob.

13.1. Sensor 1 (auto)

Select a temperature sensor after which the brightness of the LED should be regulated. Selectable sensors are sensors 1 to 6 as well as "All Sensors" and "No Sensor". The brightness of the LED is determined by the start-up and full load thresholds of the sensors. If more than one sensor is selected per LED, the sensors are first analyzed individually and the highest result (i.e. the highest brightness) is used to control the LED.

If the brightness of the LED was manually adjusted, this call deactivates the manual regulation and activates the temperature-dependent regulation.

13.2. Sensor 2 (auto)

Allows the selection of an additional sensor to regulate the brightness of the LED. For details, see 13.1. Sensor 1 (auto).

13.3. Brighter/Darker

Select here whether the LED should become brighter or darker with increasing temperature at the assigned sensors.

13.4. Brightness

Activate the manual regulation of the brightness for the LED and allows the setting of a constant brightness. The entered value is represented by a graphical bar.
If the brightness of the LED was regulated temperature-dependent, this call deactivates the temperature-dependent regulation and activates the manual regulation.

13.5. Flash during alarm

By activating this function the connected LED flashes when an alarm is triggered.

13.6. Back

Leaves the submenu and returns to the LED selection

14. Menu „Clock and Timer“

14.1. Clock set

Enter the current day of the week as well as the time (24 hour format). As long as the device is supplied with power, the weekday and time remain current. If the aquaduct is connected to the standby-power supply of the PSU, time stays current even when the PC is turned off (soft-off).

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14.2. Turn-On Time 1

Enter a time at which the relay should switch on. All individual weekdays as well as "Every Day", "Mo to Fr" as well as "Weekend" are selectable. By selecting "Never" the switch time is deactivated. Furthermore you can set the exact time (24 hour format) at which the process should be executed.

14.3. On-Time 1

Determines how long the relay should remain on after "Turn On Time 1". Adjustable in 1-30-second-steps from 1 to 240 seconds, alternatively "Permanently on" (value> 240).

14.4. Turn-On Time 2

Enter a second time as described in 14.2. Turn-On Time 1.

14.5. On-Time 2

Enter a second time as described in 14.3. On-Time 1.

14.6. Turn-Off Time 1

Enter a time at which the relay should switch off. All individual weekdays as well as "Every Day", "Mo to Fr" as well as "Weekend" are selectable. By selecting "Never" the switch time is deactivated. Furthermore you can set the exact time (24 hour format) at which the process should be executed.

14.7. Off Time 1

Determines how long the relay should remain off after "Turn Off Time 1". Adjustable in 1-30-second-steps from 1 to 240 seconds, alternatively "Permanently off" (value> 240).

14.8. Turn-Off Time 2

Enter a second time as described in 14.6. Turn-Off Time 1.

14.9. Off Time 2

Enter a second time as described in 14.7. Off Time 1.

14.10. Back

Leaves the submenu and returns to "Settings".

15. Menu „Power measurement“

The aquaduct 360/720 XT mark III offers advanced functions to calculate absorbed of emitted power of up to two zones of the cooling circuit. Prerequisites for these calculations are water temperature sensors at two points of the cooling system and flow measurement. These sensors are already integrated into the aquaduct or can be connected to the PC interface board respectively.
Using the two temperature sensors for water inlet and outlet temperatures, the current power dissipation of the aquaduct can be monitored. Furthermore, single spots or areas of interest can also be monitored, for instance by using two additional temperature sensors in the water supply and outlet lines of the CPU water block, current CPU power dissipation can be monitored (sensors und CPU water block are not included in delivery).

From the difference in temperature and the flow, the emitted energy is calculated. To calculate the power, the heat capacity of water is needed, which is 4187 Ws/(kg * K). Therefore energy of 4187 Ws is needed to heat up 1 kg of water by 1 Kelvin.
Power= heat capacity * volumetric current („flow“) * difference in the temperature
The power measurement is generally somewhat problematic due to the inertia of the system, especially shortly after the start up of the system the power measurement will show values that deviate from the real power. Also every additive to the water will change the heat capacity of the cooling liquid, which can not be taken into consideration in the calculation of the aquaduct. You should therefore regard the calculated value only as interesting additional information.

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15.1. Measurement 1 Sensor 1

Choose the temperature sensor with the lower temperature for the power measurement 1. This for instance could be the supply line of a water cooler or the return line of the aquaduct.

15.2. Measurement 1 Sensor 2

Choose the temperature sensor with the higher temperature for the power measurement 1. This for instance could be the return line of a water cooler or the supply line of the aquaduct.

15.3. Measurement 2 Sensor 1

Choose the temperature sensor with the lower temperature for the power measurement 2. This for instance could be the supply line of a water cooler or the return line of the aquaduct.

15.4. Measurement 2 Sensor 2

Choose the temperature sensor with the higher temperature for the power measurement 2. This for instance could be the return line of a water cooler or the supply line of the aquaduct.

15.5. Back

Leaves the submenu and returns to "Settings".

16. Menu „Fill level “

16.1. Recalculate fill level

After selecting this menu entry, the aquaduct will perform an analysis of the current fill level and you will leave the settings menu. To perform the fill level analysis, the pump will temporarily be set to a (low) reference speed and after completion be reset to its original speed. A prerequisite for a reliable level analysis is a preceding calibration of the 100 % reference value.

16.2. Set 100 % reference

Selecting this menu entry will reset the 100 % reference value to the current fill level and leave the settings menu. For a reliable fill level analysis, this value must be initialized first. Due to the measuring principle of the fill level, the 100 % reference value must be reset each time the water circuit is changed even if only slightly.

To calibrate fill level measurement, please follow these instructions:

1. Check the current fill level using the mechanical fill level indicators and add coolant until the level indicators are approximately 1 cm below the top of the level indicator.
2. Start the calibration process by selecting this menu entry.

To perform the fill level analysis, the pump will temporarily be set to a (low) reference speed and after completion be reset to its original speed.

16.3. Back

Leaves the submenu and returns to "Settings".

17. Menu „Factory defaults“

By using this function, default settings for all parameters of the aquaduct can be restored.

17.1. Load defaults

Overwrites all settings of the aquaduct with factory defaults.
NOTE: If the relay is used to switch the ATX-break-line, the computer will be shut down immediately because also the data of the relay is returned to the default setting. In order to avoid data loss, you should therefore disconnect all devices except the aquaduct from the PSU prior to loading the default settings!

17.2. Back

Leaves the submenu and returns to "Settings".

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18. Example configuration

In the following chapters, some configurations are explained in an exemplary way. The sensors and fan canals used can easily be changed to meet your actual needs.

18.1. Regulate water temperature to a target temperature of 40° C

For quiet but also powerful operation of the aquaduct, using the target temperature control mode is best suited. Target temperature mode allows for real-time power adjustment of the aquaduct and therefore assures the quietest operation while maintaining the full cooling capacity of the aquaduct if needed.

Set the following values for Sensor 1 ("Water out"):

Target temperature: 40 °C

Set the following values for Fan 1 to Fan 3 (top/middle/bottom):

Sensor 1 (auto): "Water out"
Minimum power: 30 %
Control mode: Target temperature
Hold minimum power: enabled

Result:
Up to a water temperature of 40 °C at the water outlet of the aquaduct, Fan 1 to 3 run at low speed at 30 % power. Should the water temperature rise over 40 °C while on this fan speed, fan speed will be raised to keep the temperature constant at around 40 °C up to a fan power of 100 % if necessary. If the water temperature drops below 40 °C, fan power will be reduces again to a minimum of 30 %.

18.2. Temperature-dependent illumination of the aquaduct

Set the following values for Sensor 1 ("Water out"):

Start-up temperature: 30 °C
Maximum temperature: 50 °C

Set the following values for the LEDs:

Red LED:

Sensor 1 (auto): “Water out“

Brighter/darker: brighter when warmer

Blue LED:

Sensor 1 (auto): “Water out“

Brighter/darker: danker when warmer

Result:

While the water temperature rises, the red LED lightens up while the blue LED gets darker. Below 30 °C the blue LED glows at 100 % while the red LED is turned off, above 50 °C the red LED glows at 100 % while the blue LED is turned off. As a result, the color changes depending on the temperature from blue over violet to red.

18.3. Emergency shutdown of the PC on temperature alarm

Preparations:

The relay connector is integrated into the ATX control line of the power supply unit and standby power is provided to the standby power connector (additional accessories required, not included in delivery).

Configuration:

Set the following values for Sensor 1 (“Water out“):

Alarm temperature: 65 °C

(Set all other sensors to very high values if they are to be ignored)

Set the following relay parameters:

Relay automatic mode: enabled

Relay Usage: ATX-Break-Line

Enable alarm: enabled

Set the following alarm parameters:

Alarm events: Temperature alarm: on

Alarm-Off timeout: 10 seconds

Alarm time: Switch permanently

Result:

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If a water temperature of 65 °C or more is being detected, a warning screen will be displayed in the display of the aquaduct for 10 seconds. If the water temperature continues to be over the alarm threshold, in this case 65 °C, the computer will be shut down by disrupting the ATX control line.

19. Special notices

19.1. Using the relay in connection with the power button connector

If the relay output of the aquaduct is connected to the power button of the motherboard and is correctly configured, the computer can be switched on by pushing the rotary knob of the aquaduct. This requires standby power supply (additional accessories required, not included in delivery).

19.2. Using the relay to disrupt the ATX control line

If the relay output of the aquaduct is integrated into the ATX control line of the PSU, standby power supply must be connected (additional accessories required, not included in delivery).
To start the computer for the first time, the relay must once be switched on manually. This is done in the menu "Relay".

19.3. Starting the PC when using standby power supply

When using standby power supply, a menu is displayed on the aquaduct when the PSU is switched on. In this menu, you can choose the relay usage. Depending on your configuration, you need to select “ATX Break Line“ or “Power Switch“ and confirm the selection by pressing the rotary knob. When using the ATX-Break-Line, the PC may now be switched on via the main power button. If the relay is connected to the power switch header of the motherboard, you can start your PC by pressing the rotary knob. This menu shows up after every cut in the power supply.
Please note: If the PC starts up immediately after pressing the rotary knob when using the ATX break line, „Restart after AC power loss“ (or similar) is most likely activated in the computer BIOS.

19.4. Restrictions of the emergency shutdown functions

The emergency shutdown function, if connected and configured properly, can prevent damages to your hardware. However no protection can be a hundred percent secure. We therefore deny any liability for damages that are created by or in spite of using this function. Especially with the connection as a power button on the motherboard, the emergency shutdown may remain unsuccessful!

19.6. Configuring display contrast on start-up

When switching on the device, the contrast of the display can be regulated by turning the rotary knob. By doing this the start process is extended and normal operation is temporarily suspended. After the last movement of the knob it will take a moment before the operation starts!

20. Trouble shooting

20.1. Loading factory defaults on start-up

In individual cases it can occur that the settings stored in the device are destroyed, for example if the power supply to the device is interrupted during a writing process. In this case, all default settings can be reinitialized. To do this, hold the rotary knob pressed down when switching on the device. The Display will read "Factory defaults, please hold 3 seconds". After a successful deletion, the display will confirm loading factory defaults. Please let go of the knob, the device will restart automatically with default configuration.
NOTE: If the relay is used to switch the ATX-break-line, the computer will be shut down immediately because also the data of the relay is returned to the default setting. In order to avoid data loss, you should therefore disconnect all devices except the aquaduct from the PSU prior to loading the default settings!

Now that you have completely read the instructions, we wish you much joy with our products. For further questions please do not hesitate to contact us via e-mail or also in our support forum.

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