

# Water Cooling and Sensor Panels

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Principal Solutions Architect

# Agenda

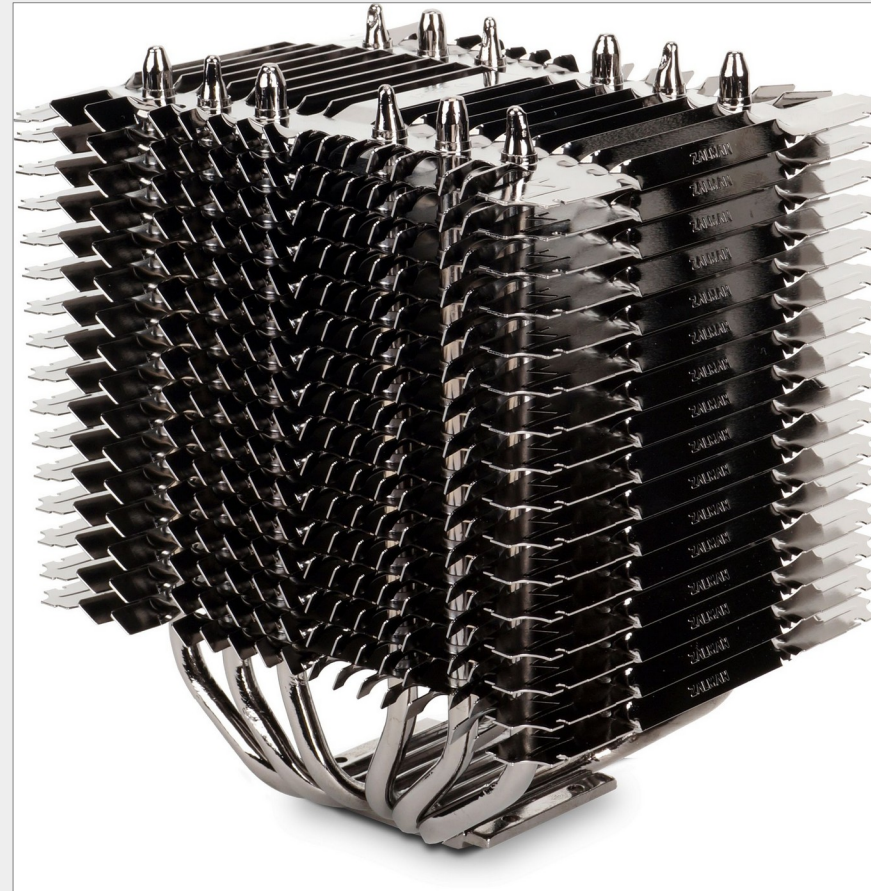
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- Types of cooling
- Water cooling components
- My rig
- Sensor panels
- Real time sensor software

# Types of cooling

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- Passive



# Types of cooling

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- Active





# Types of cooling

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- Liquid
- Two Loop types
  - Closed
    - AIO (all in one)
    - Custom Loop



# Types of cooling

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- Extreme Liquid
  - Nitrogen





# Types of cooling

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- Submersion
  - Distilled water
  - Mineral oil



# Water cooling components

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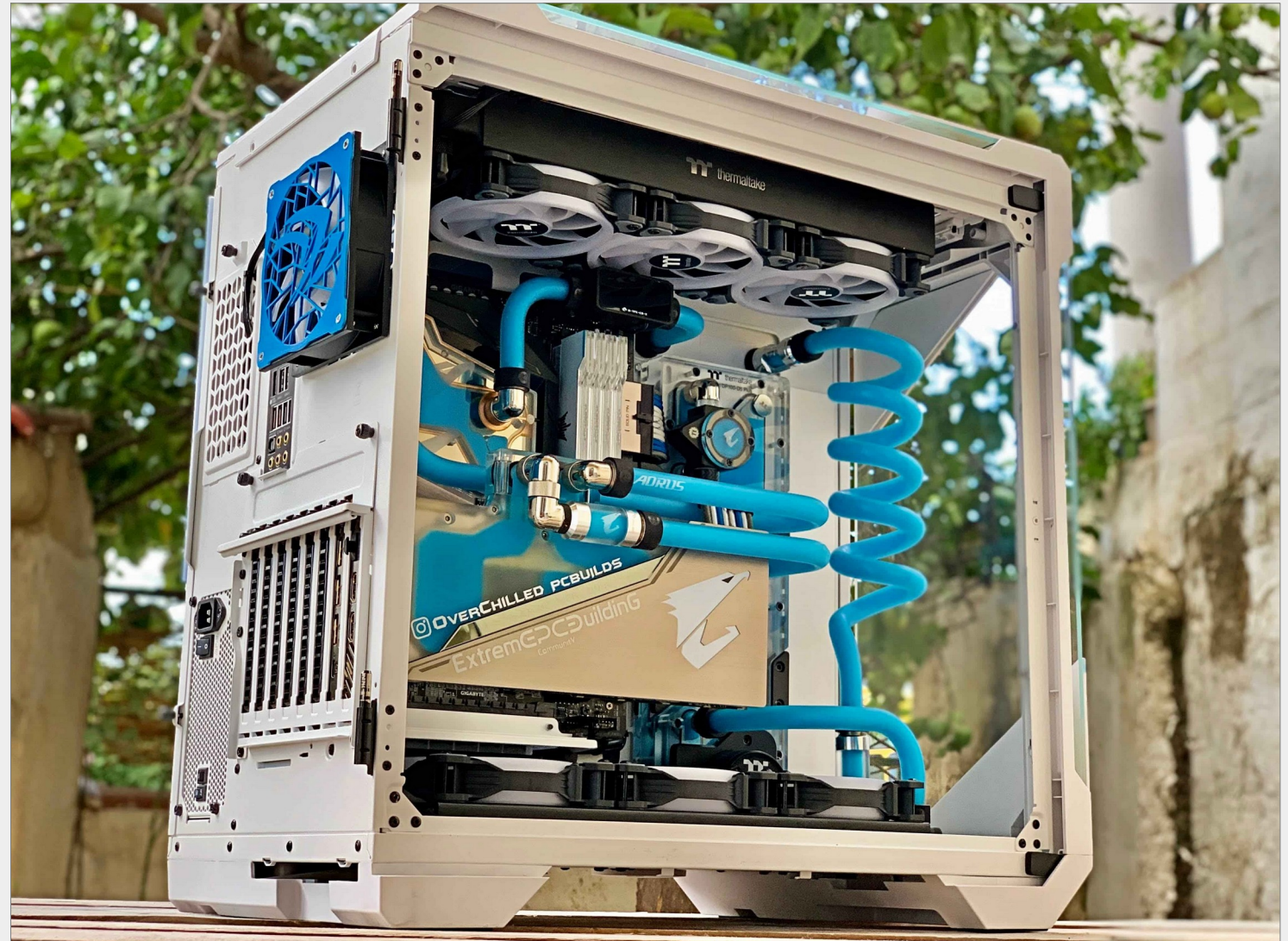
- Closed loop
  - AIO
    - Pump / CPU block combo
    - Radiator
    - Fans
    - Tubing
    - Coolant





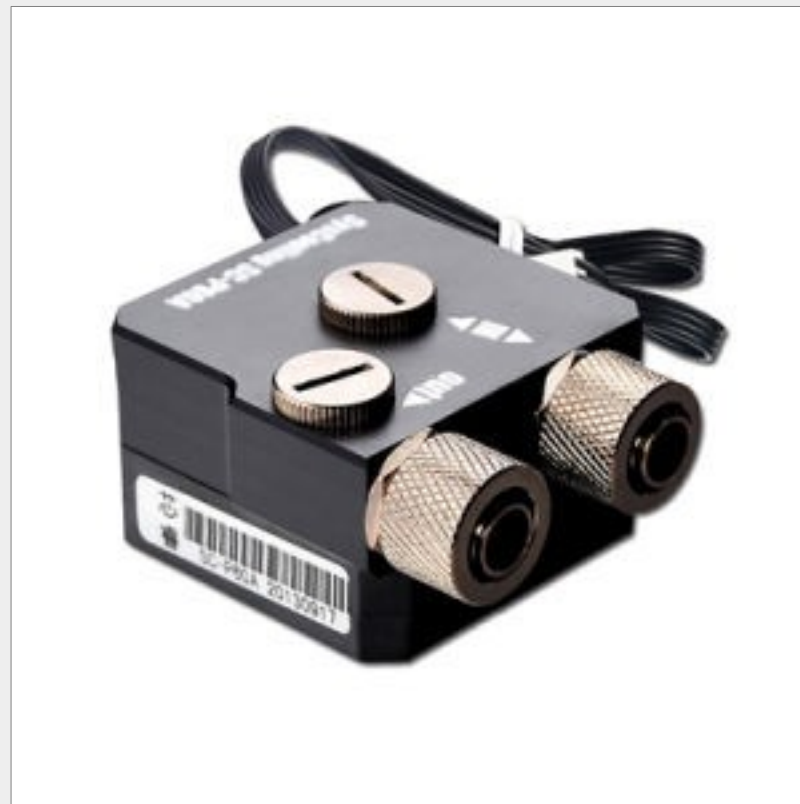
# Water cooling components

- Custom loop
  - Pump
  - CPU block
  - Graphics card block
  - Radiator
  - Fans
  - Tubing
  - Fittings
  - Coolant
  
- Memory block
- Distribution plate
- Flow meter
- Coolant temperature probes
- Drain port



# Water cooling components

- Custom loop
  - Pump
  - Pump Combo (w/reservoir)



# Water cooling components

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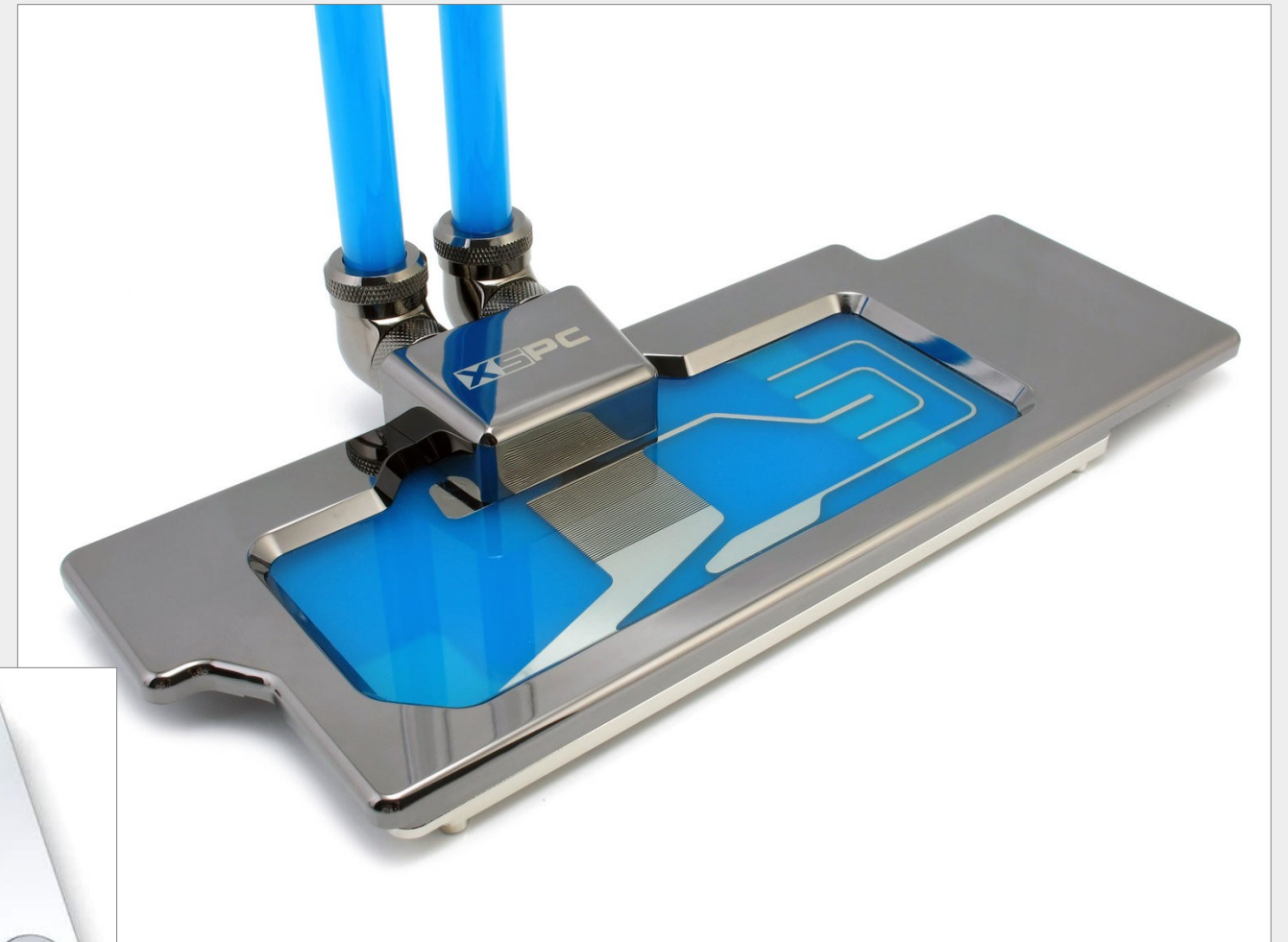
- Custom loop
  - CPU block





# Water cooling components

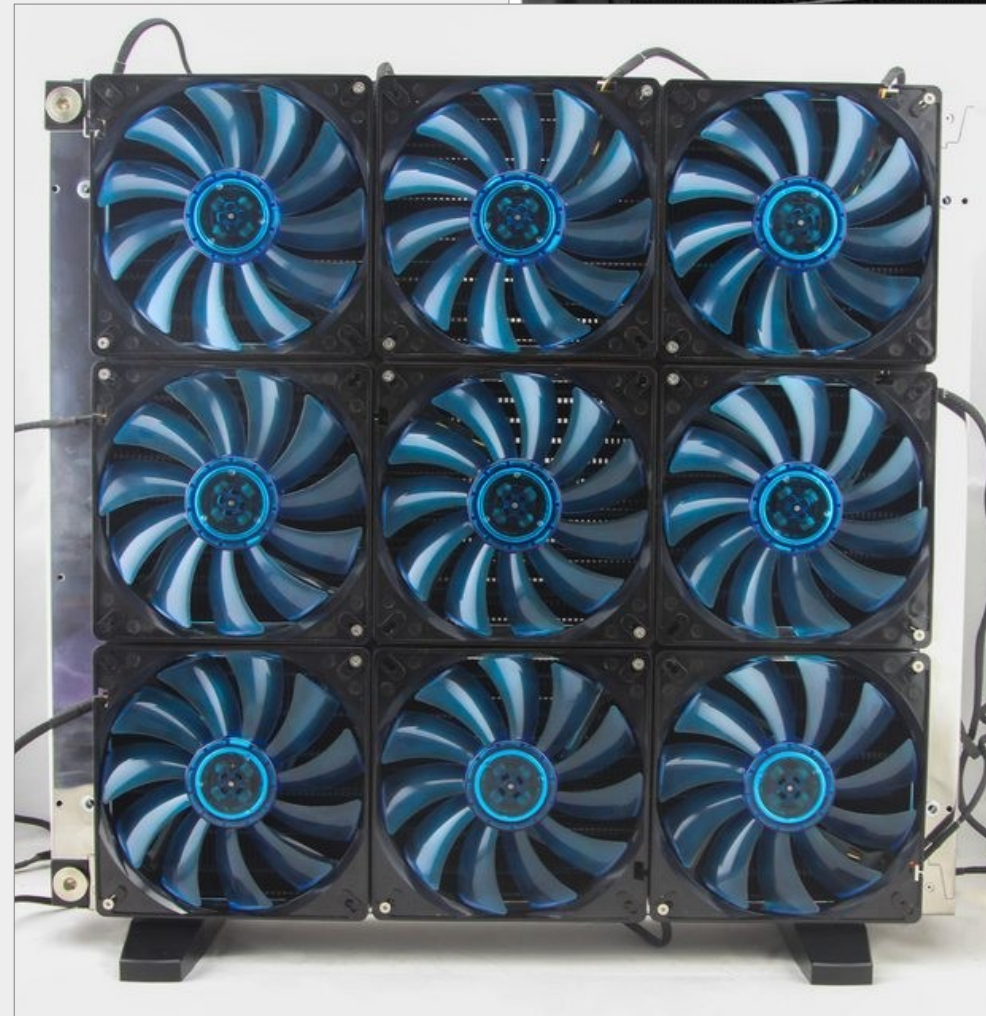
- Custom loop
  - Graphics card block
  - Graphics card back plate



# Water cooling components

- Custom loop
  - Radiator
    - Internal
      - 120/140
      - 240/280
      - 360/420
      - 480/560
    - External

- \* Length
- \* Thickness



# Water cooling components

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- Custom loop
  - Fans
    - Regular
    - High Static Pressure
  - Sizes
    - 120mm
    - 140mm
    - 200mm





# Water cooling components

- Custom loop
  - Tubing
    - Soft
      - Neoprene
      - Rubber
      - Silicone
      - PVC
    - Hard
      - Acrylic
      - PETG
      - Glass
      - Aluminum
      - Copper



InnerDiameter (ID) / OuterDiameter (OD)

10/13 mm or 3/8" - 1/2"

➔ 10/16 mm or 3/8" - 5/8"

# Water cooling components

- Custom loop
  - Fittings
    - Standard is G1/4
- What type of tubing are you using?
  - Soft tube compression (STC)
  - Hard tube compression (HDC)
- What size tubing are you using?
  - ID / OD ?



# Water cooling components

- Custom loop
  - Coolant
    - Premix
    - Distilled water
      - Add biocide



# Water cooling components

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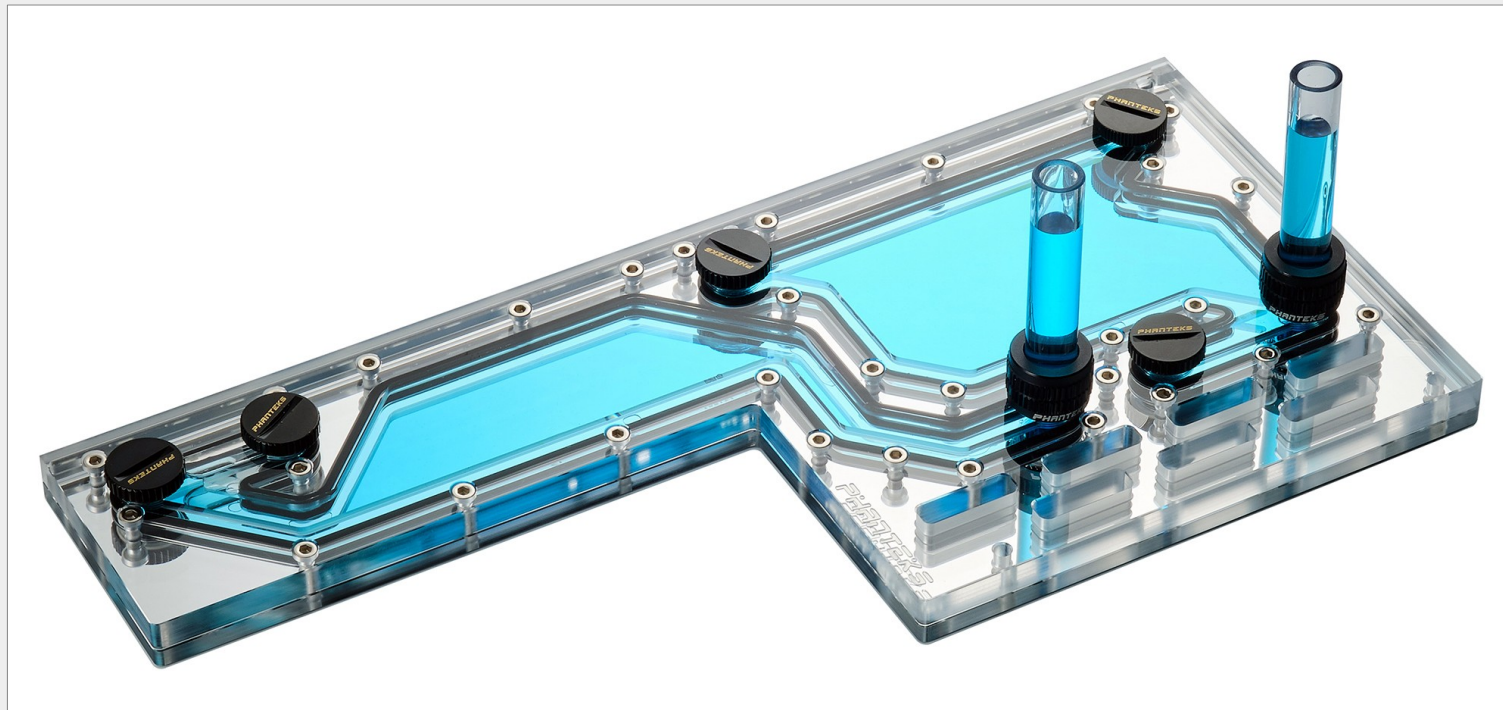
- Custom loop
  - Memory block





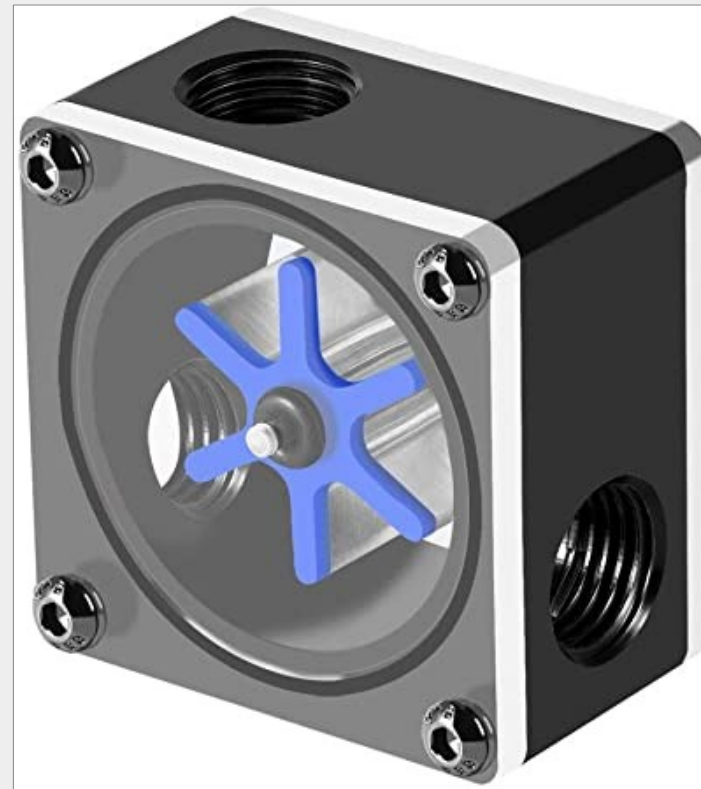
# Water cooling components

- Custom loop
  - Distribution plate
  - Distribution plate pump combo



# Water cooling components

- Custom loop
  - Flow meter
    - Analog
    - Digital



# Water cooling components

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- Custom loop
  - Coolant temperature probes





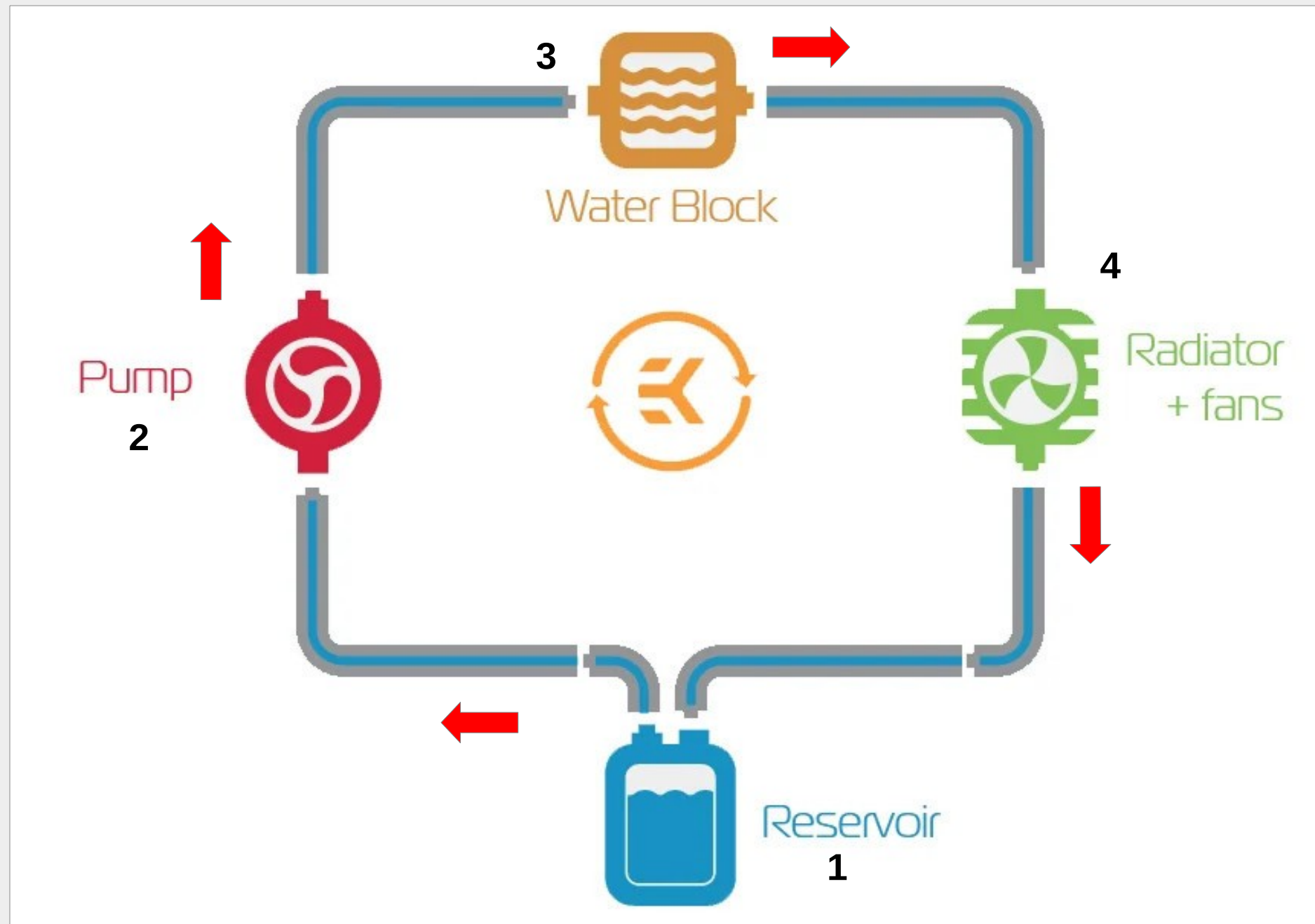
# Water cooling components

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- Custom loop
  - Drain port



# Water cooling order



# Dual loops

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- Red = CPU loop
- Green = Video loop
  
- 2 x everything!





# My rig

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- 1 CPU loop
- Custom water cooled
- 360 Radiator
- Push/Pull Fans
- Distribution plate
- Pump
- Reservoir
- White flexible tubing
- Distilled water
- Biocide
- Fittings
- LCD water temp meter
- LCD flow meter

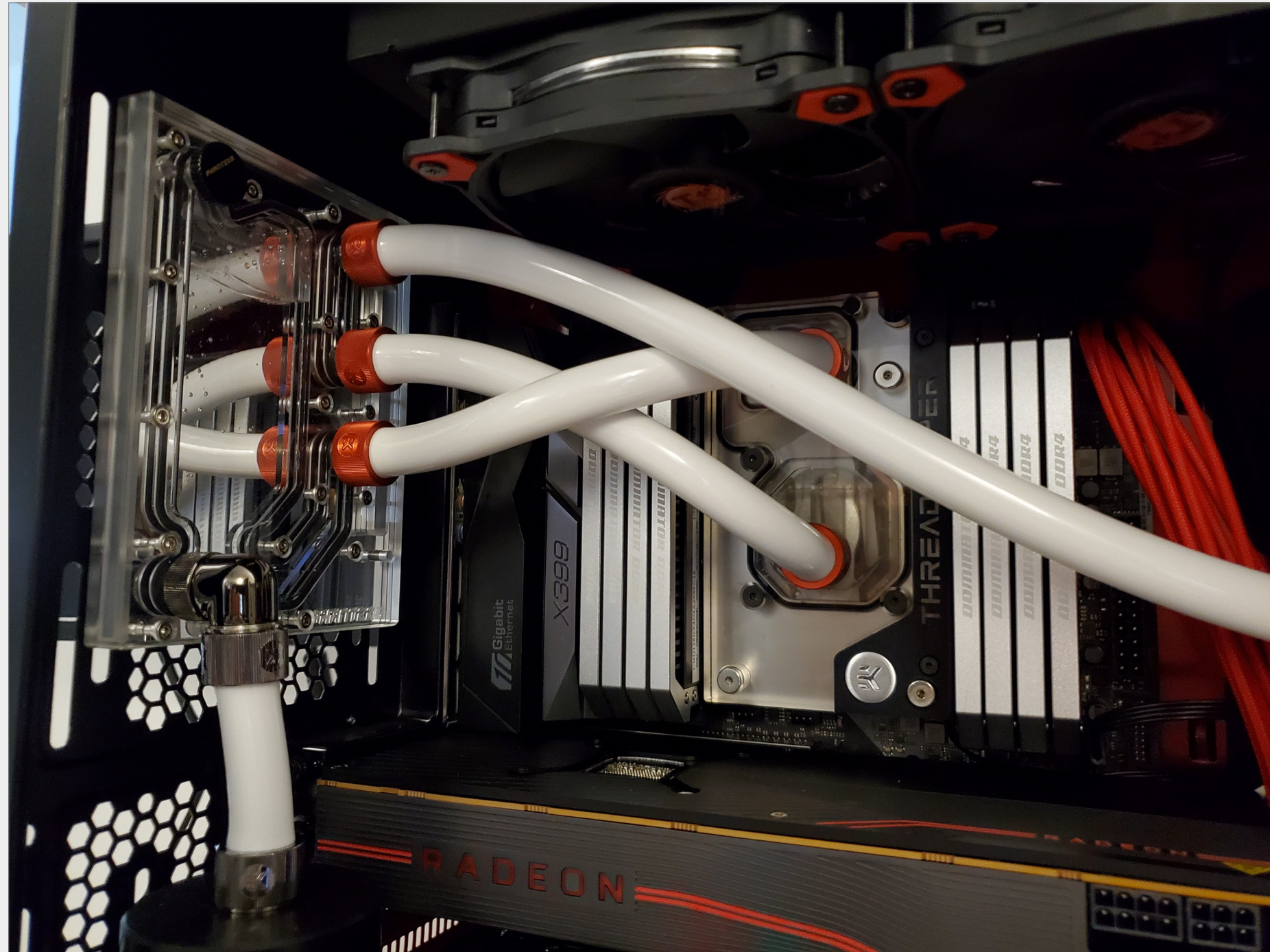




# My rig

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- Distribution plate
- CPU block





# My rig

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- Water temp
- Flow meter
- Drain valve
- Bottom intake fans





# My rig

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- What are my CPU temps?

Idle: 28C

Average workload: 28-30C

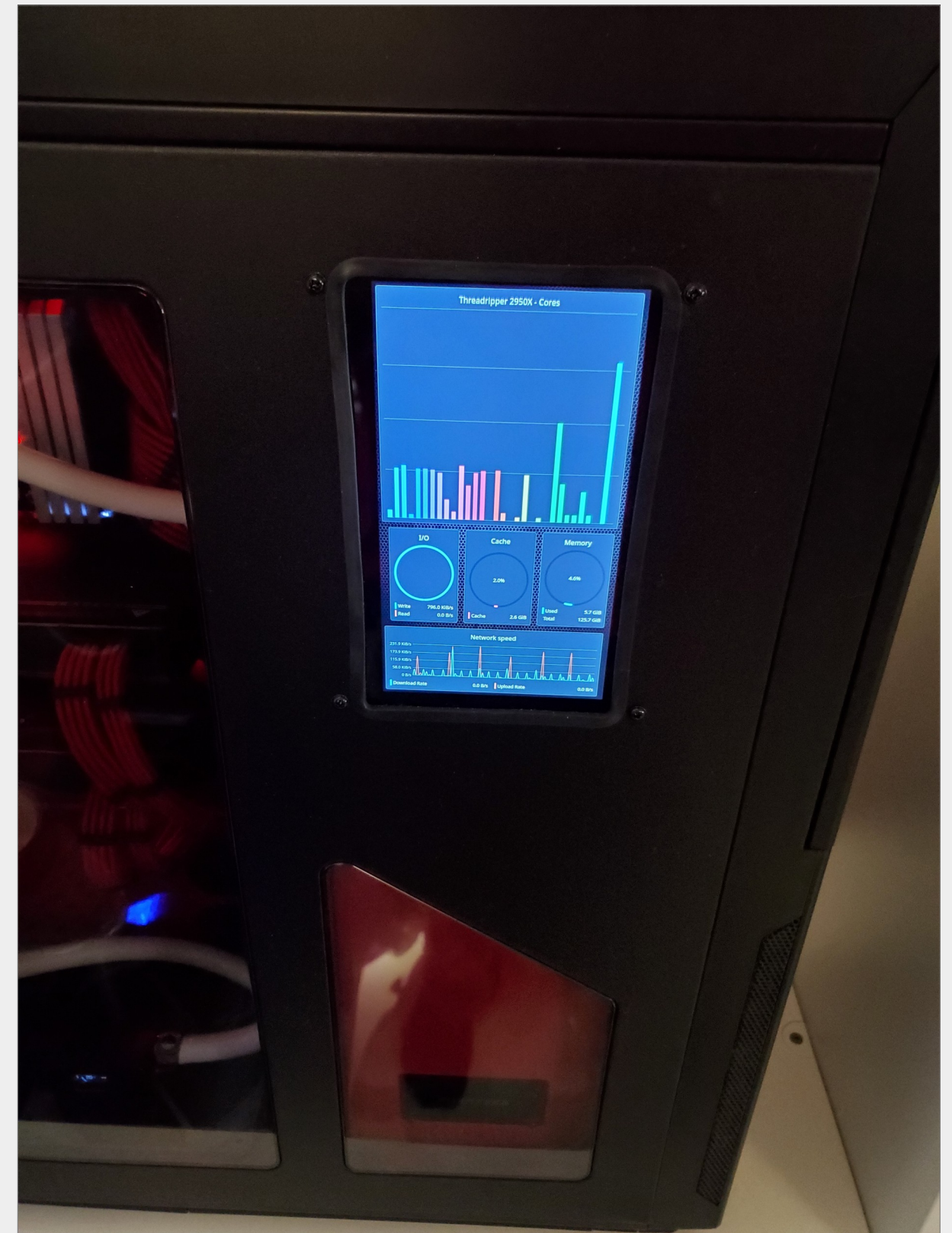
Max workload: 55-58C

Max temp for Threadripper 2950x is 80C before thermal shutdown

# My rig

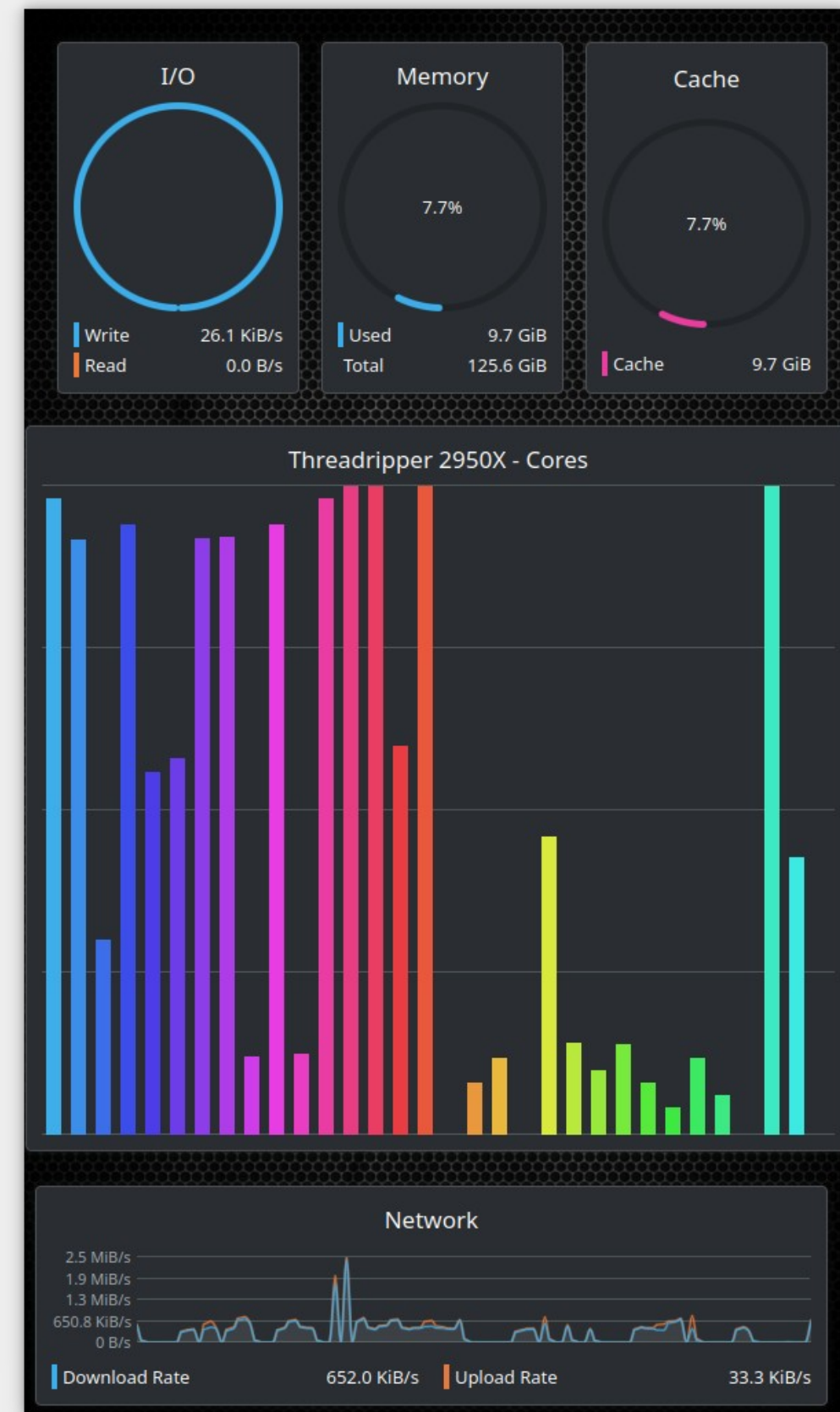
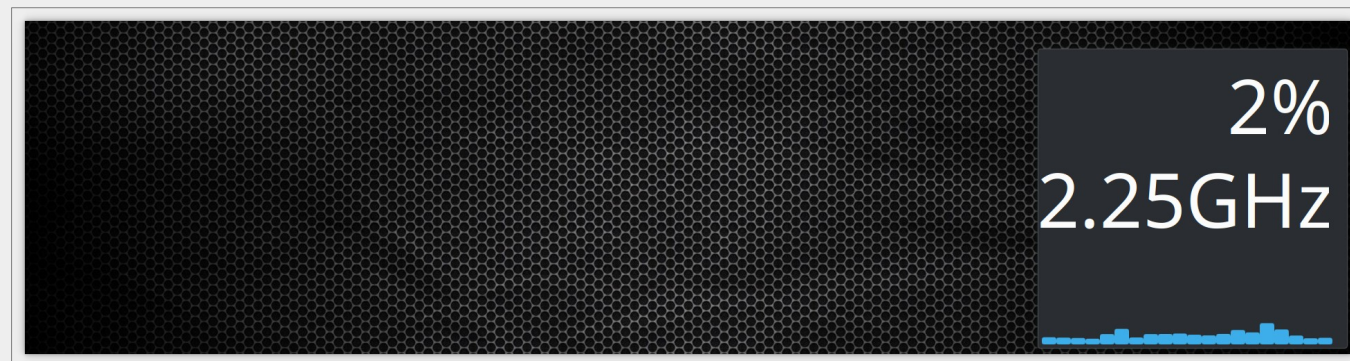
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- Side Sensor Panel case modded
- 1 x 7" vertical panel



# Sensor panels

- Small dedicated LCD panel to run an app/widget etc.





# Sensor panels

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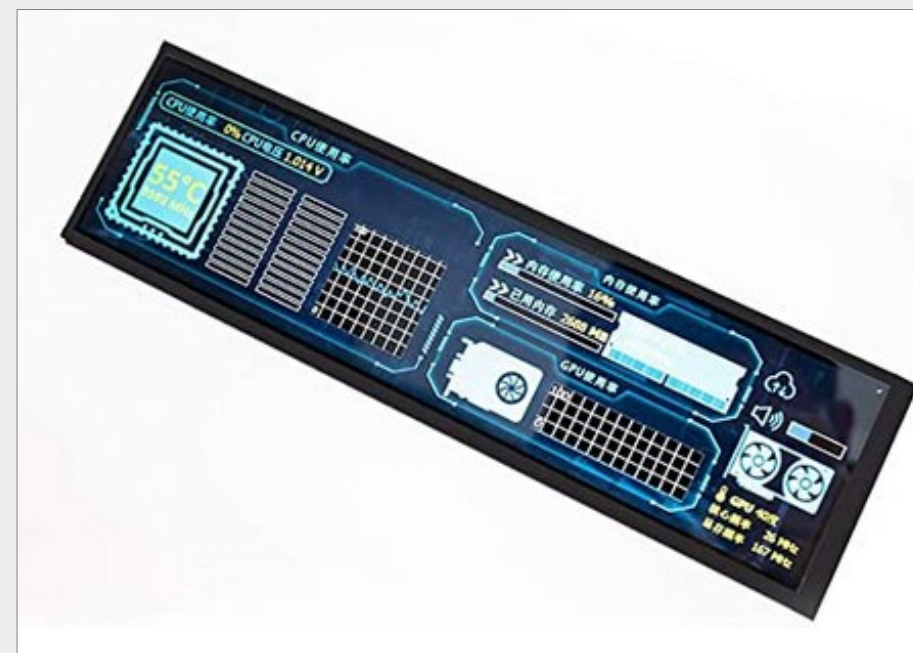
- First sensor panel mod
- SunFounder
- 7"x4" HDMI IPS LCD screen
- \$70
- HDMI cable to existing video card
- USB power to power brick



# Sensor panels

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- Second sensor panel mod
- Amazon
- 8.8"x2" HDMI IPS LCD screen
- \$66
- Mini-HDMI cable to existing video card
- USB power to power brick





# Real time sensor software

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## Monitor Power/Fans/MB temps

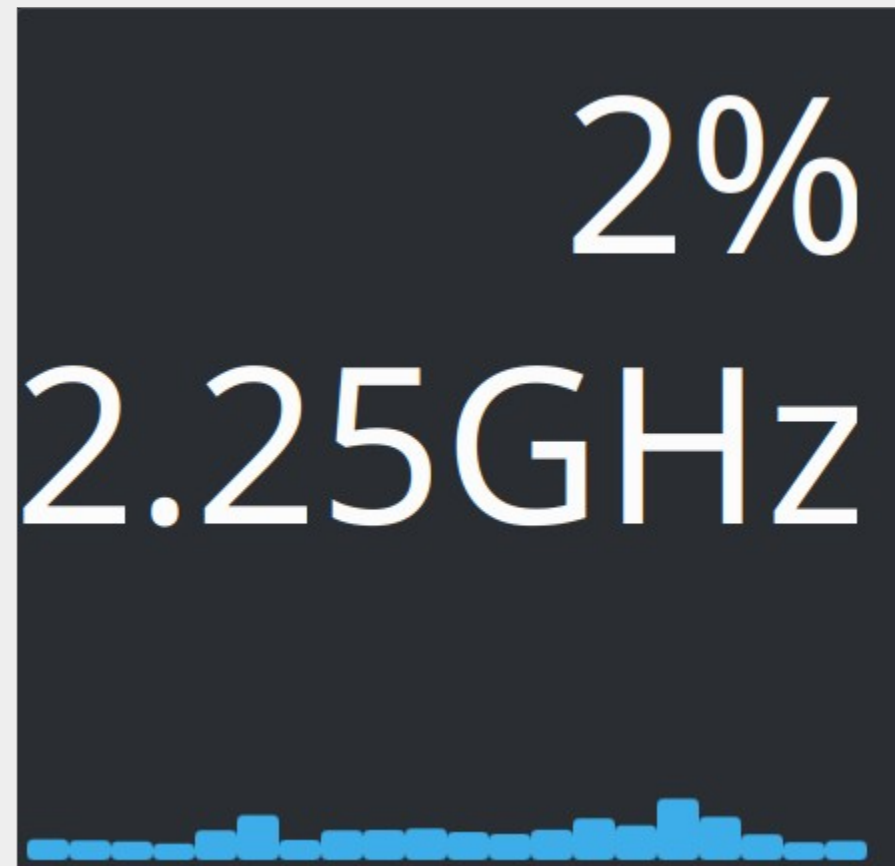
- Install lm\_sensors package
- Configure lm\_sensors - autostart  
*#sensors-detect*

## Monitor HD temps

- Install hddtemp
- Start daemon  
*#systemctl start hddtemp*

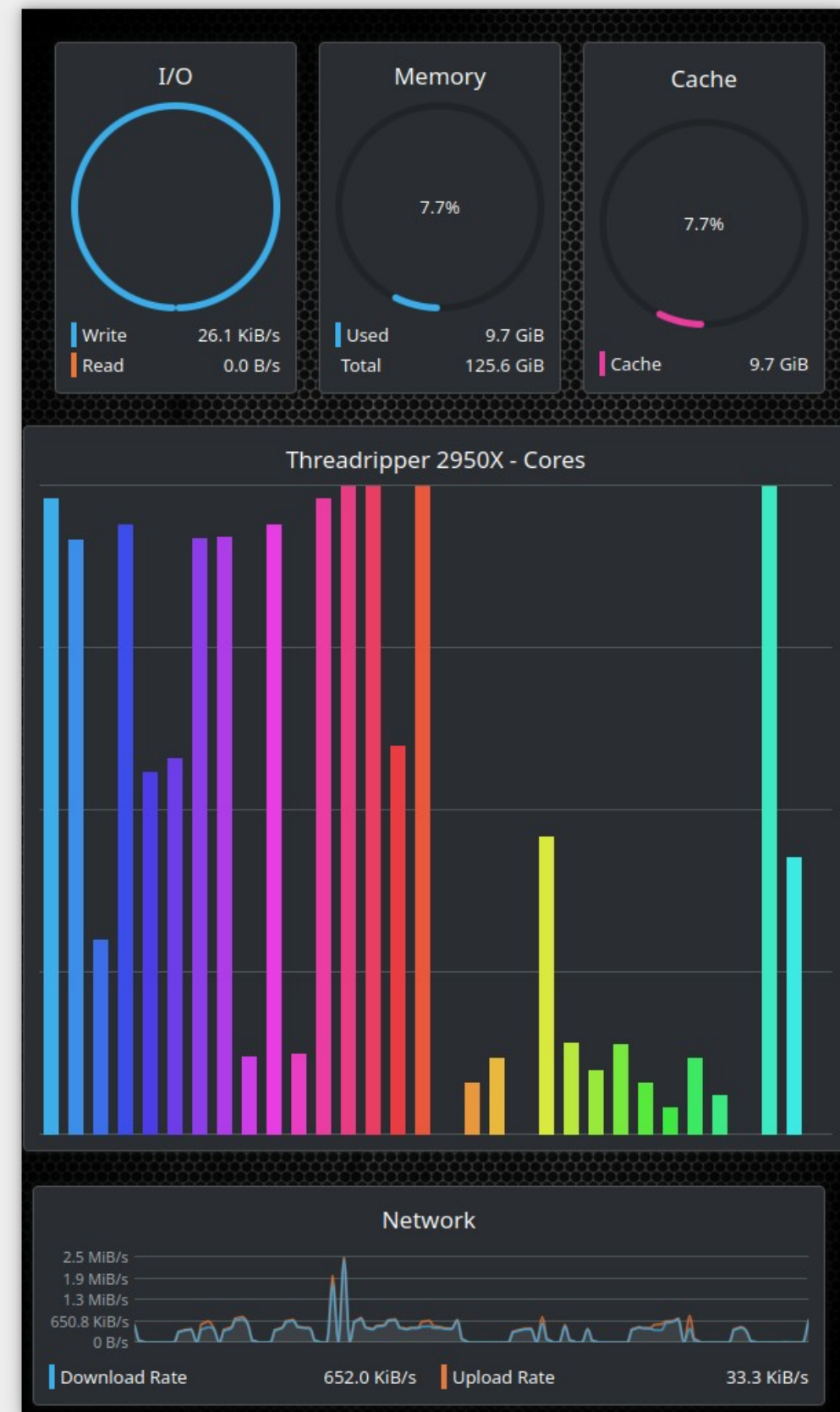
# KDE Widgets

- Install widget of choice
- Resource Monitor ...



# KDE Widgets

- Disk I/O
- Memory
- Cache
- CPU Cores
- Network

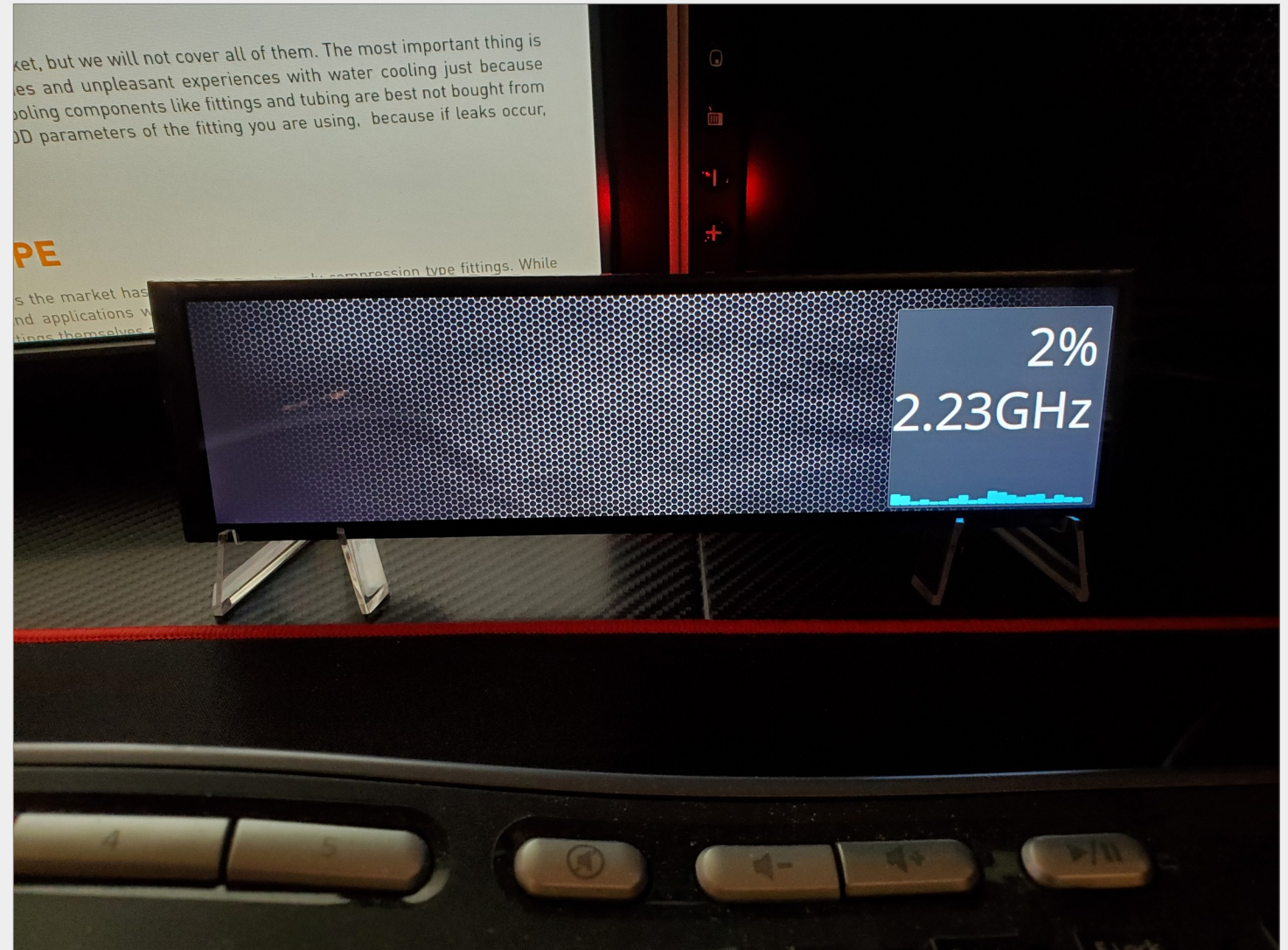




# Real time sensor software

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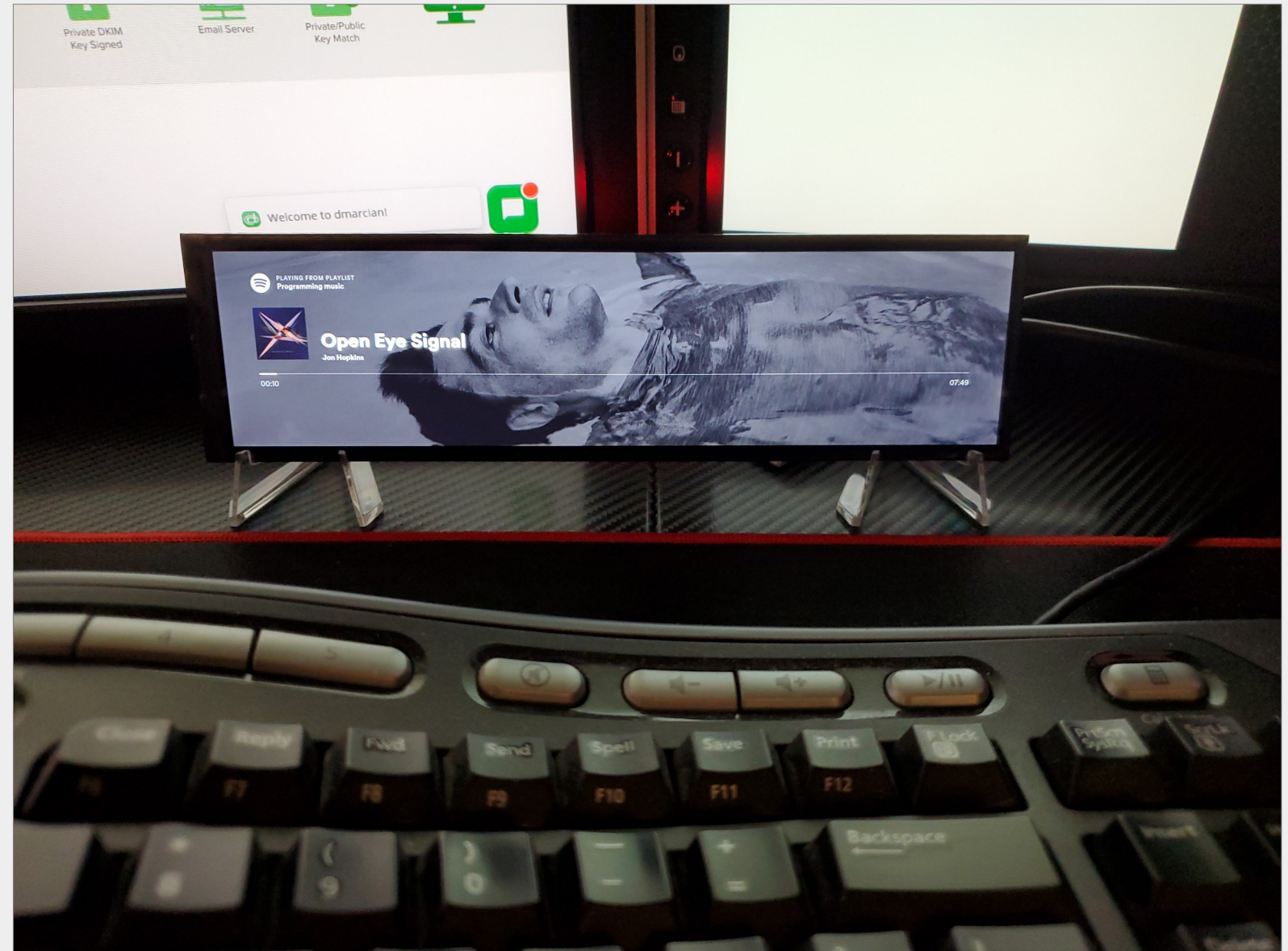
- Resource Monitor in action





# Real time sensor software

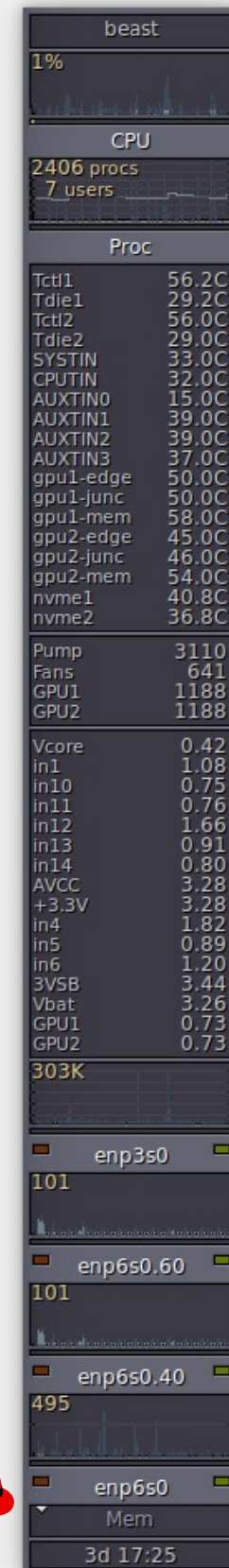
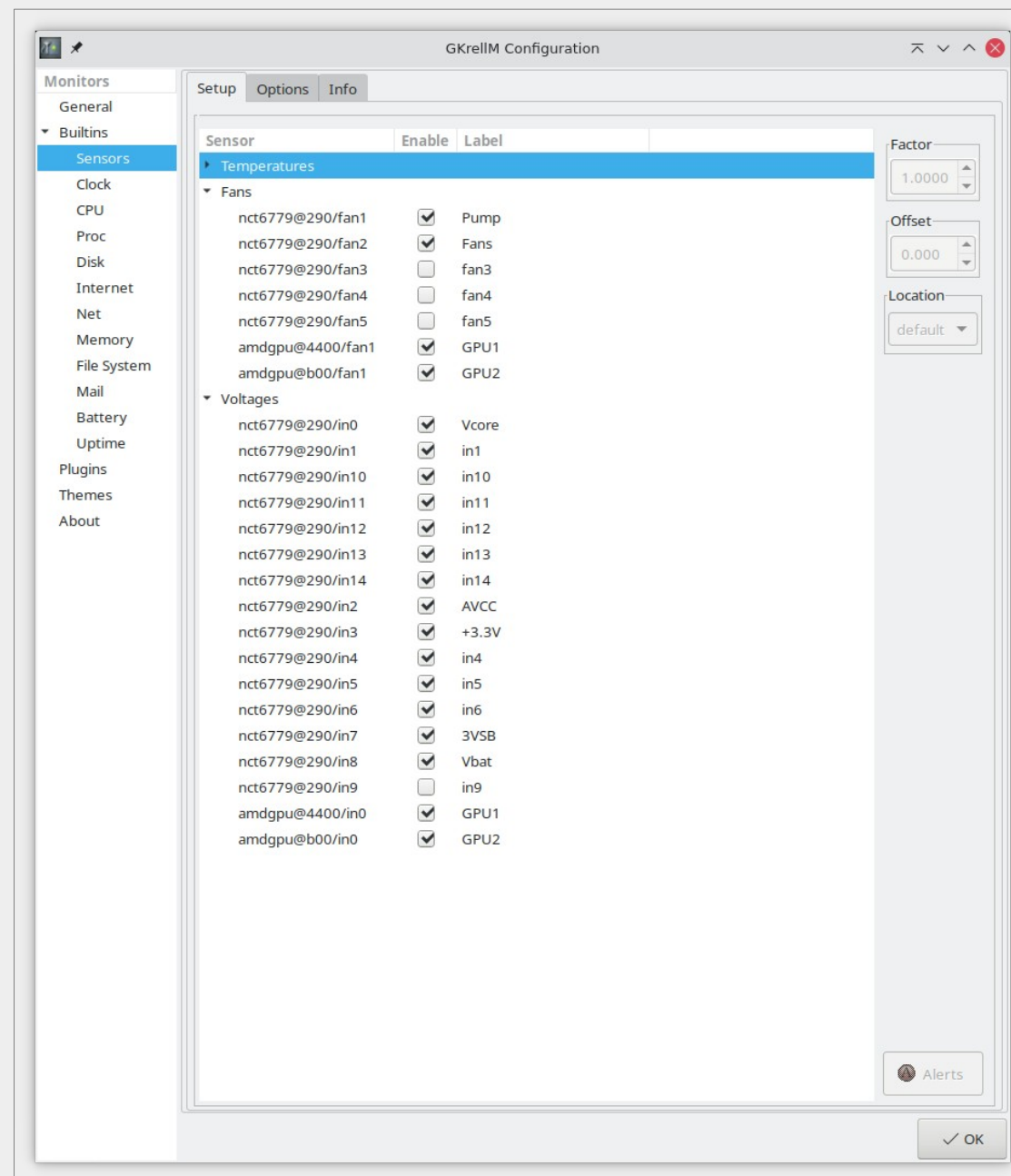
- Spotify app on dedicated panel



# Real time sensor software

## gkrellm

- Install gkrellm package
  - Requires lm\_sensors
  - Configure via GUI
- 
- MB temps
  - Pump RPM
  - Fan RPM
  - GPU fan RPM
  - MB Voltages



# Thank you

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