Supplementary

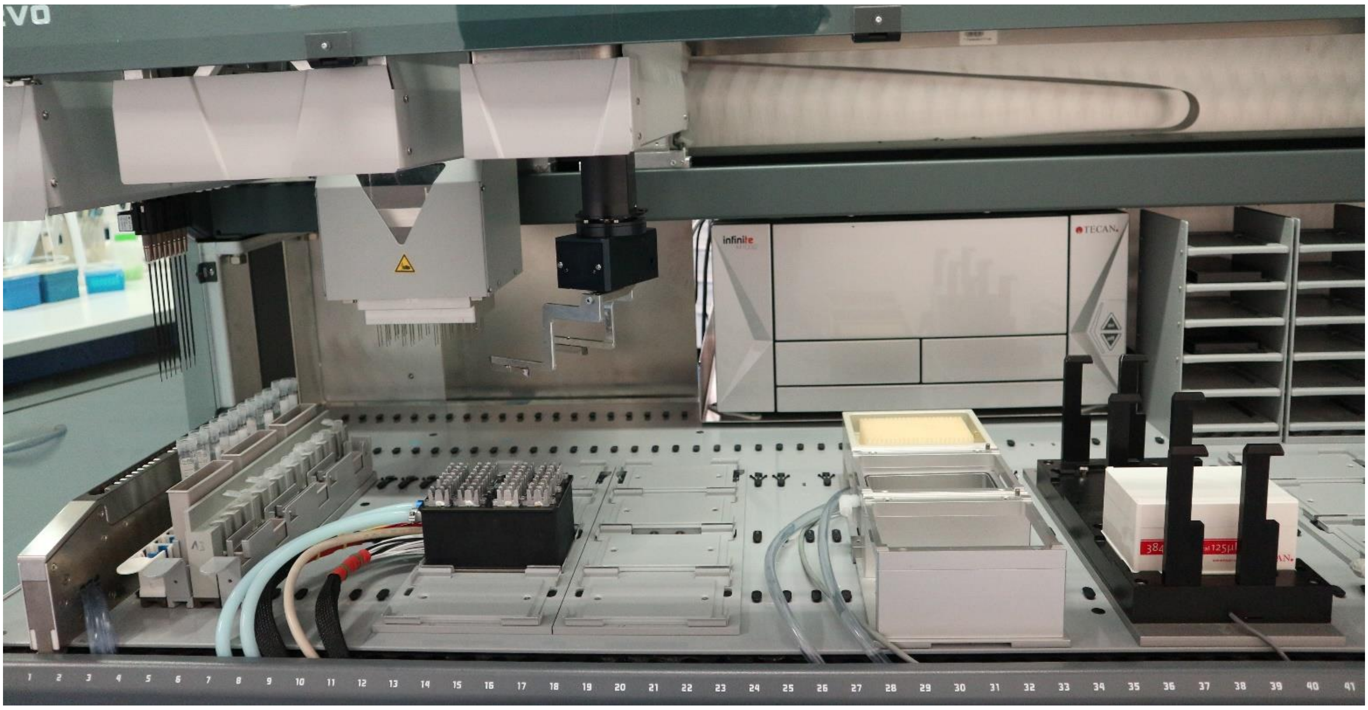

Figure S 1: Main view of the physical set-up in the liquid handling station. From the top left part to the top right part of the picture are shown: The three liquid handling arms: 8 needle arm (LiHa), 384-needle arm (MCA 384) and plate gripper (RoMa) (Tecan, Switzerland). In the centre of the picture, from the middle to the right, the plate reader (Tecan, Switzerland) and the plate hotel (plate storage) are visible. From the bottom left to the right, the following components are depicted: solvent washing station, liquid container storage, thermal unit, washing station and replacement needles (replacement needles are not used in the described experiment).

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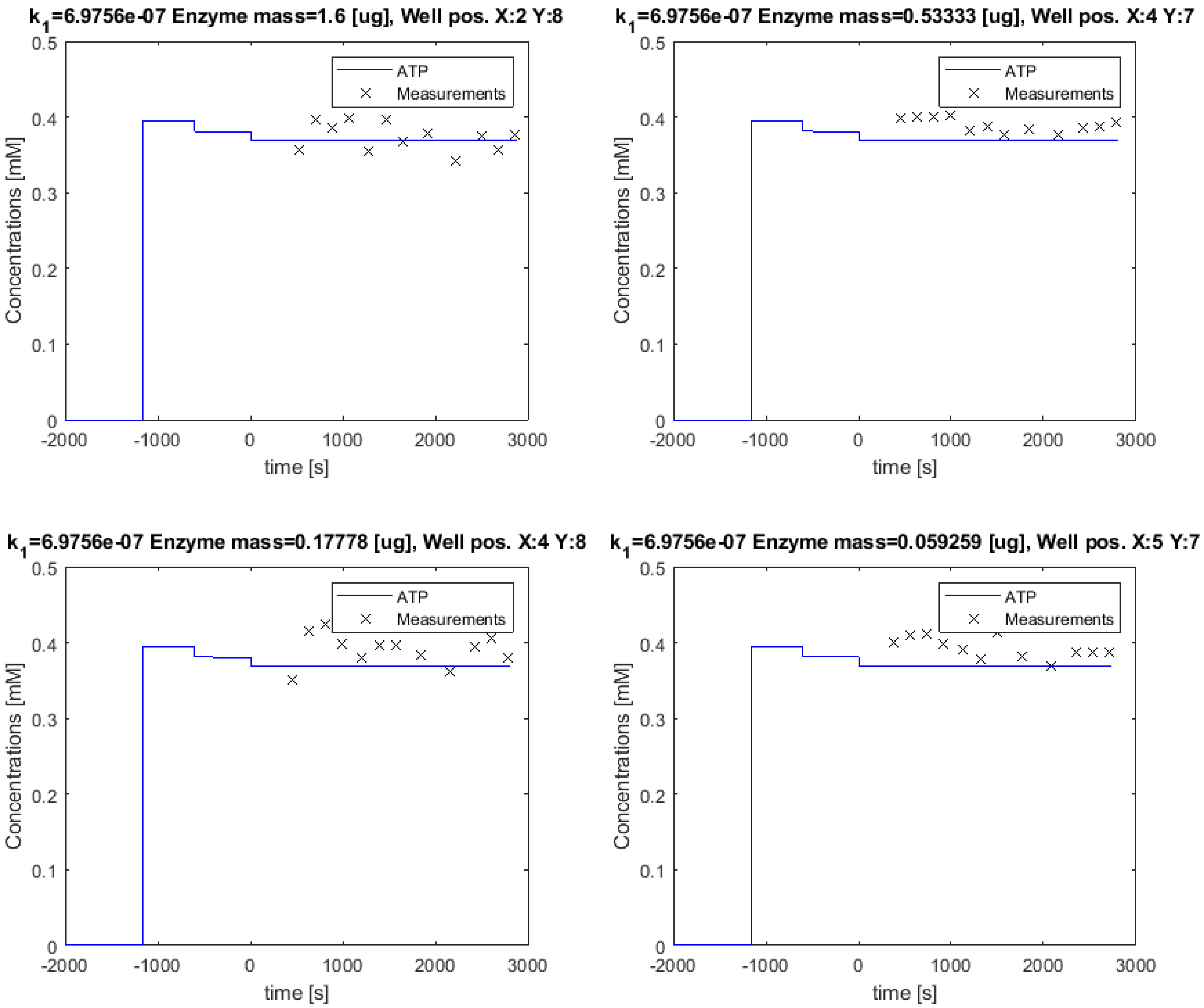

Figure S 2: Fit to enzymatic screening data at 0°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The plots are generated via the use of MATLAB.

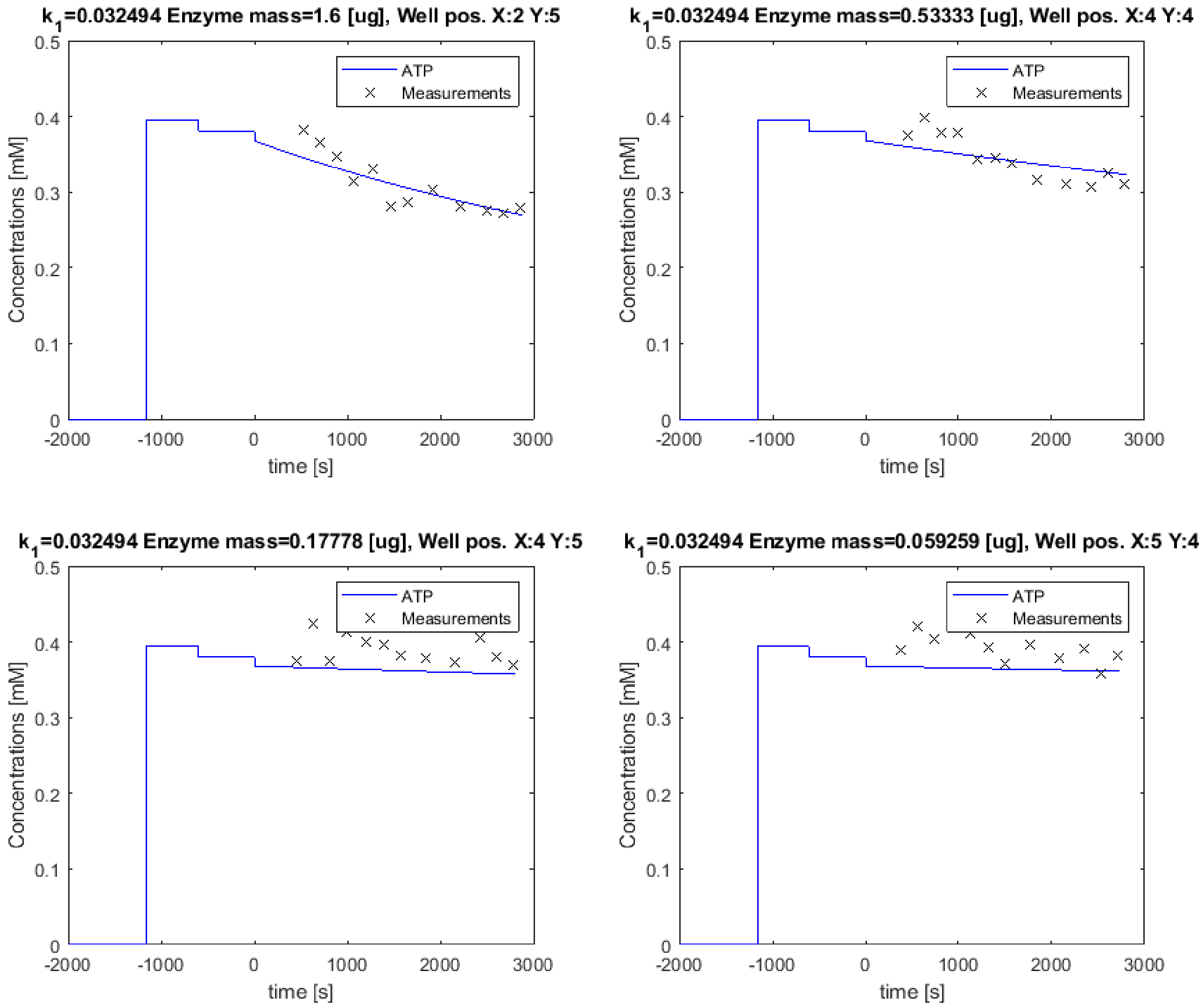

Figure S 3: Fit to enzymatic screening data at 25°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The plots are generated via MATLAB.

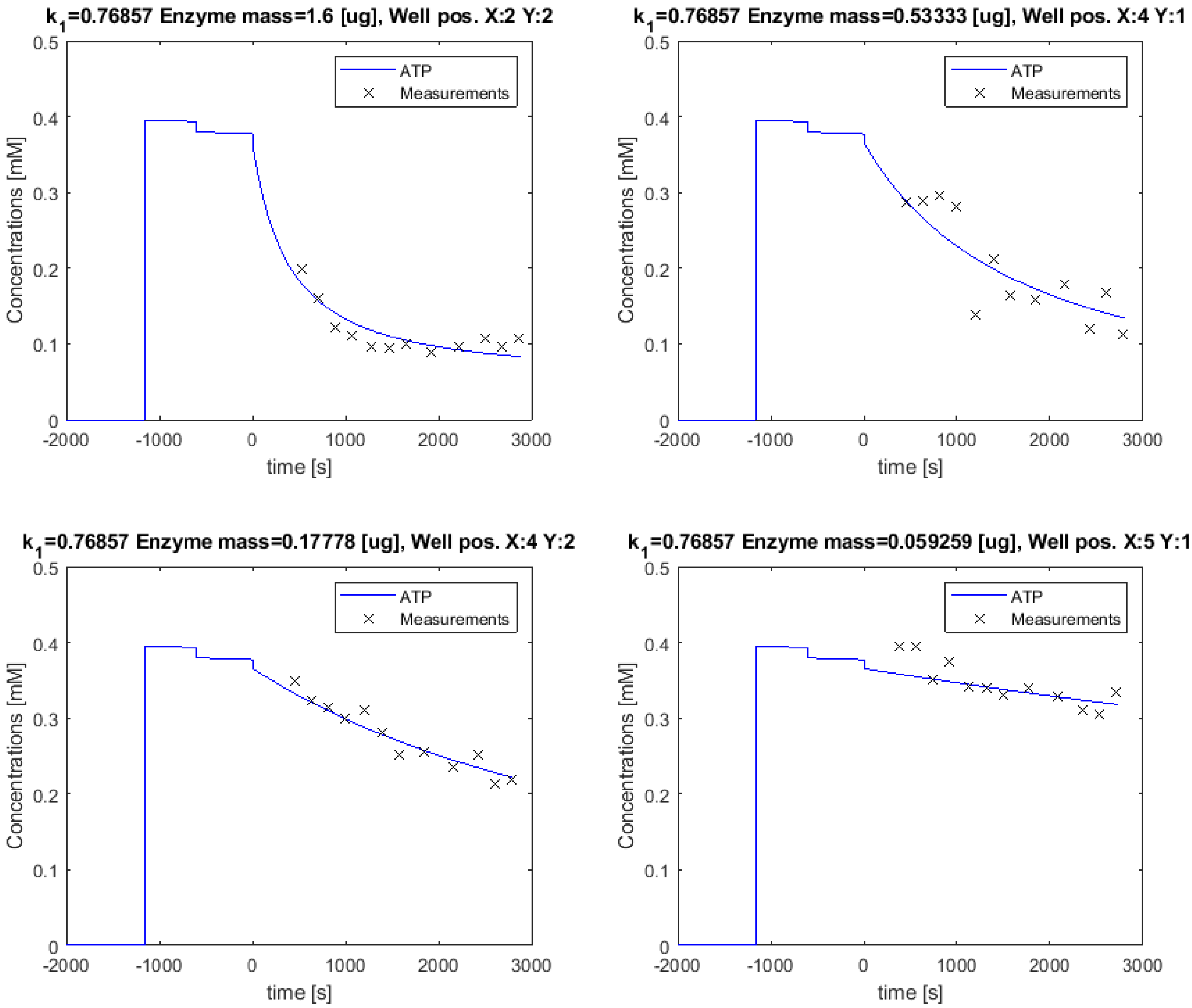

Figure S 4: Fit to enzymatic screening data at 55°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The plots are generated via MATLAB.

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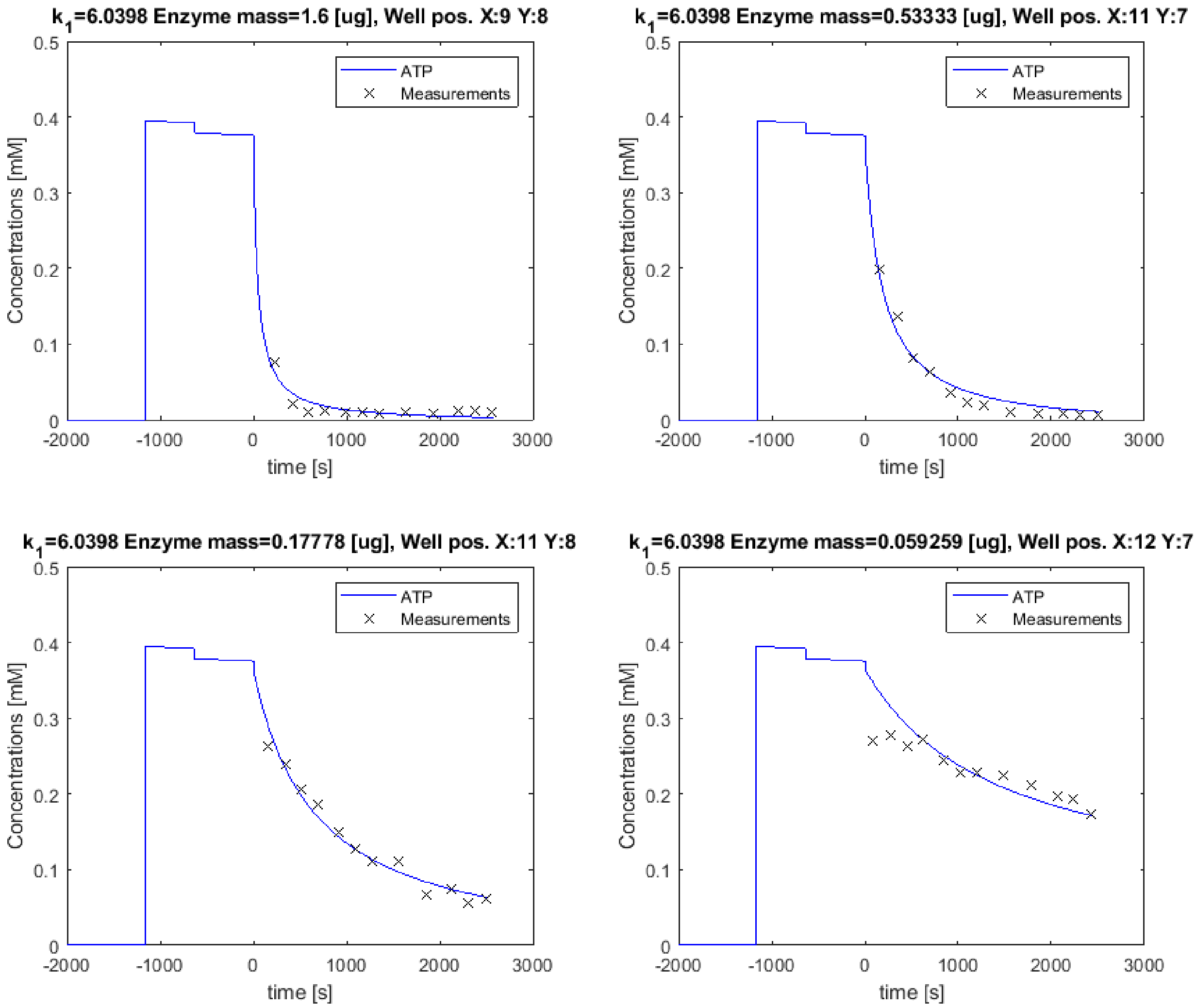

Figure S 5: Fit to enzymatic screening data at 70°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The plots are generated via MATLAB.

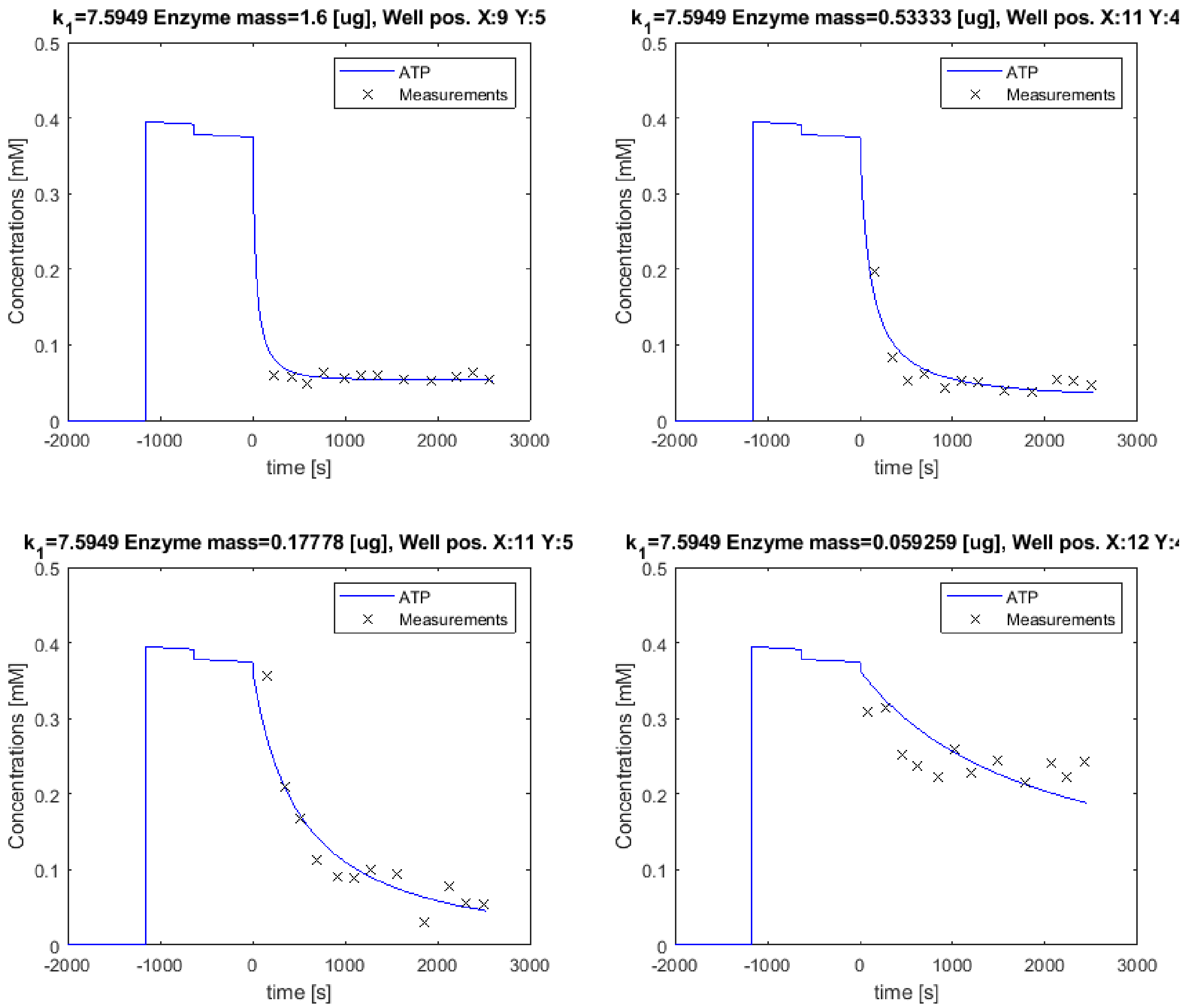

Figure S 6: Fit to enzymatic screening data at 80°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The plots are generated via MATLAB.

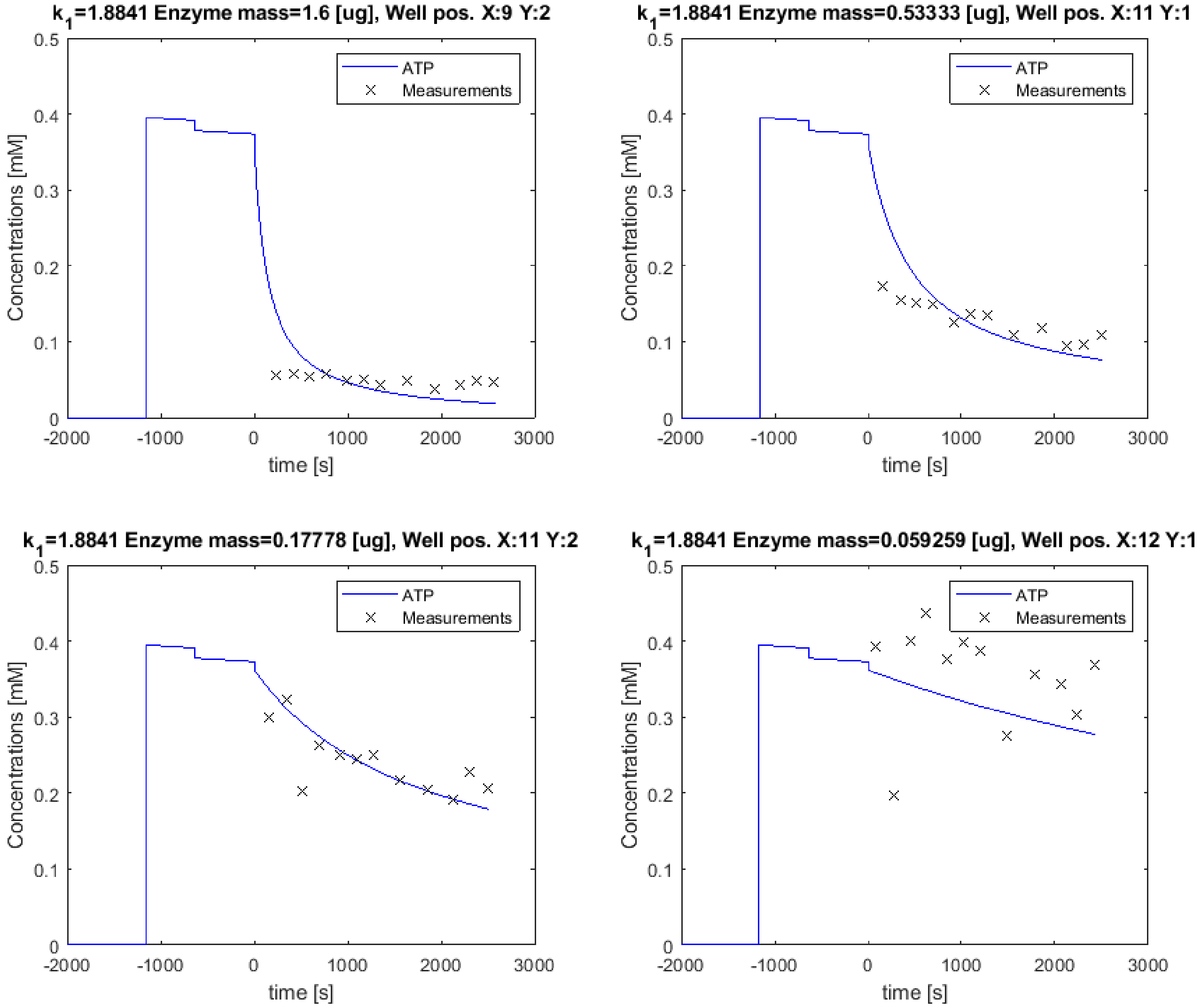

Figure S 7: Fit to enzymatic screening data at 95°C. The left upper plot uses 6 µl enzyme dilution 1:3, right upper plot uses dilution 1:9, left lower plot uses dilution 1:27 and right lower plot uses dilution 1:81. The thymidine concentration for all plots is 0.33 mM. The fits show, that the given equation describe the measurement data with systematic errors, hence the highest residuum of all estimations (Table 2). The plots are generated via MATLAB.

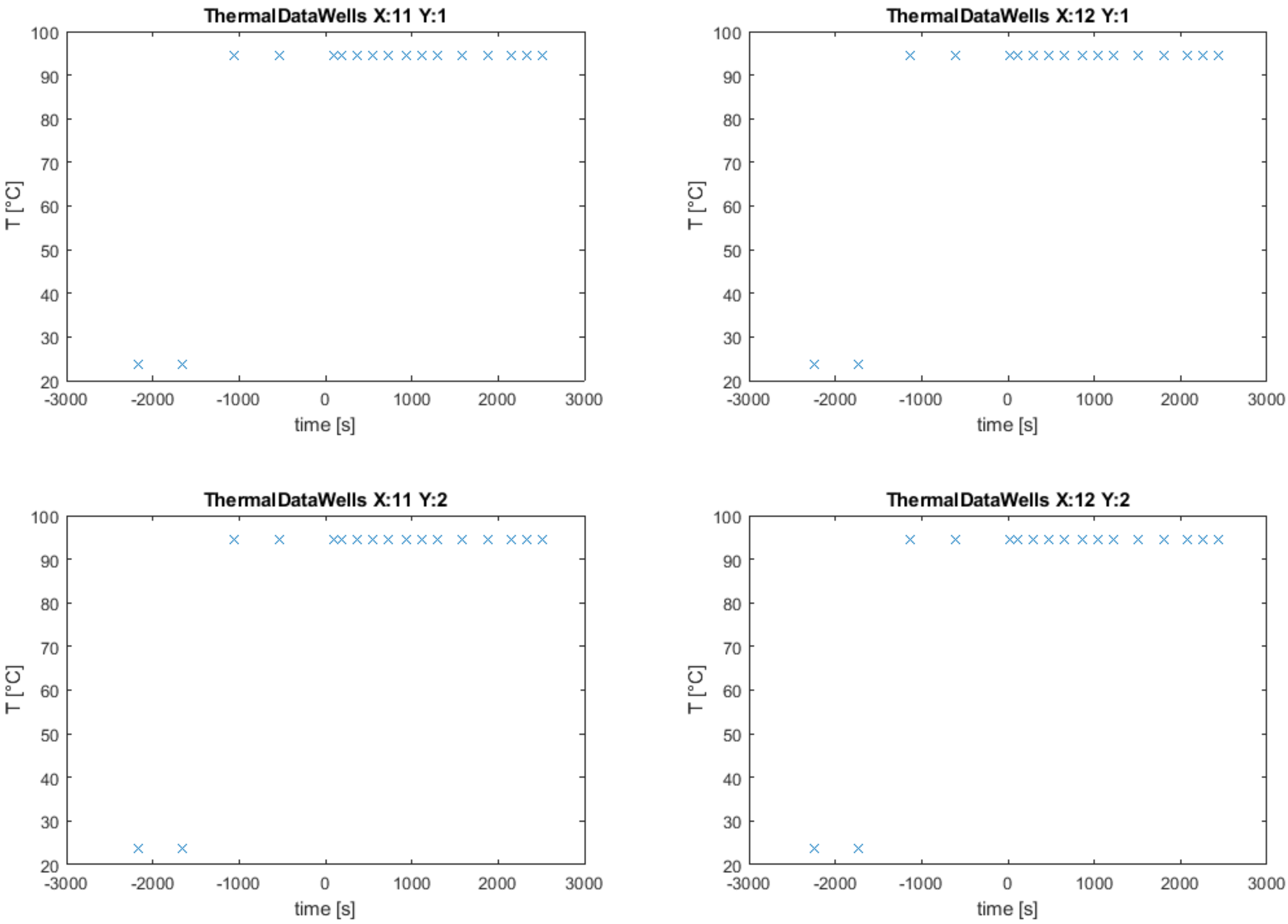

Figure S 8: Exemplary: Wells of the 4 well block reach their target temperature of 95°C, before the enzyme is added at timepoint zero. The plots are generated via MATLAB.

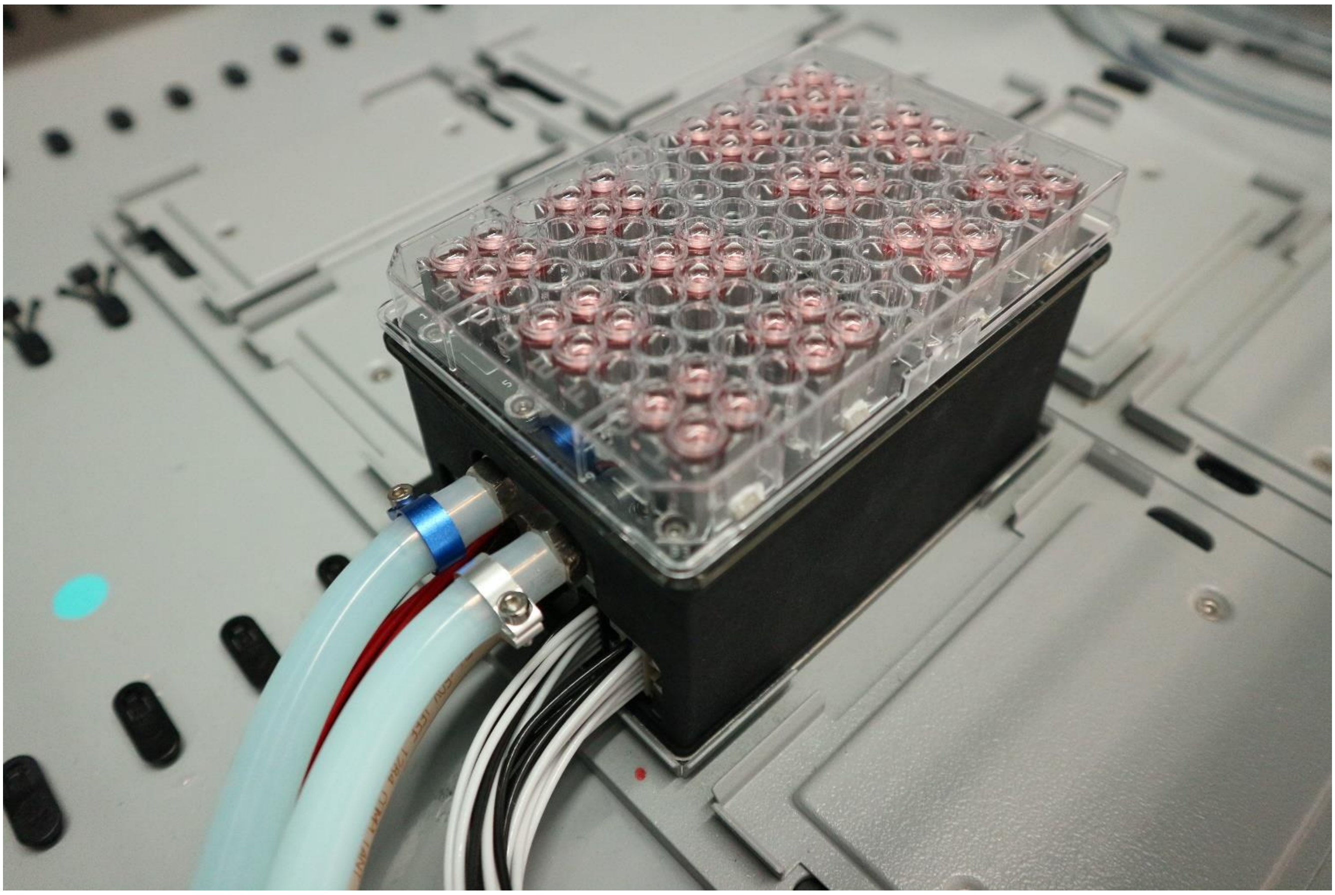

Figure S 9: Thermal unit with the 48 oil filled wells inside of the liquid handling setup. This picture was made during testing, where coloured mineral oil was used for to detect oil contaminations.

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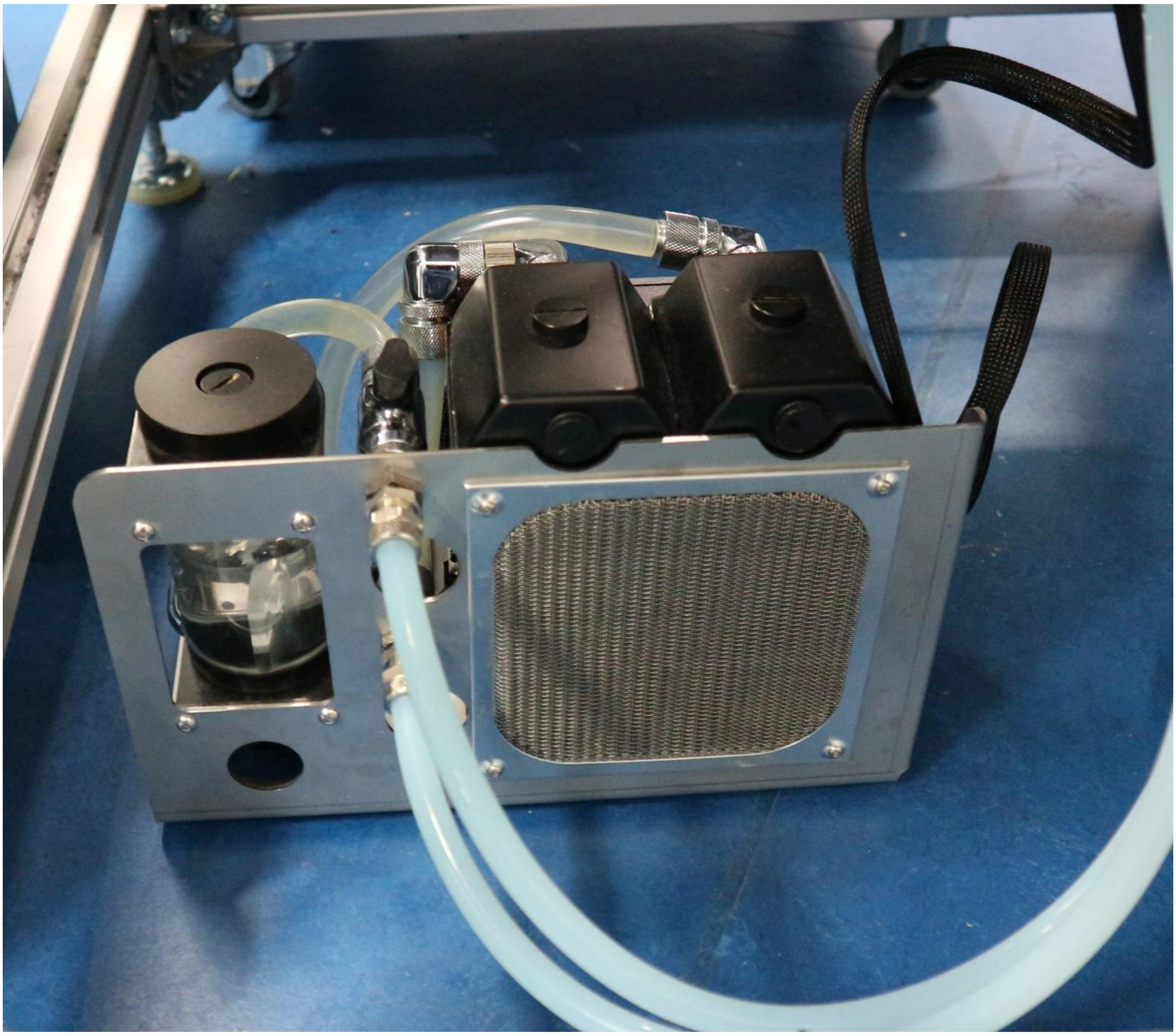

Figure S 10: Heat exchange unit or cooler. This units consists of a heat exchanger, a pump and a fan. Its purpose is to bring the thermal reference unit back to room temperature, depending on the temperature of the thermal reference unit, it will cool or heat.

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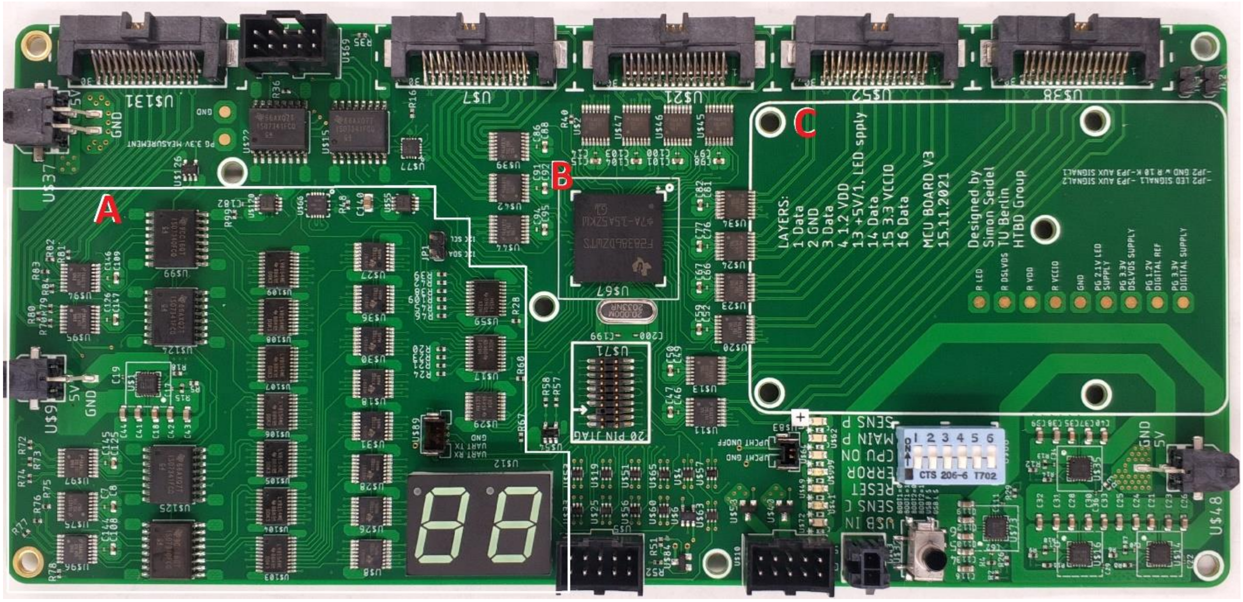

Figure S 11: Picture of the main control PCB, partially assembled (printing and assembly as shown in the picture by PCBWay, China). A) Measuring and measurement-data transfer segment. Here we employed LVDS ICs for safe data transfer, multiplexer elements and counter ICs to store all temperature measurements in parallel B) F28386 MCU (Texas Instruments, United States). This is the core element of the design. C) Placeholder for the higher-level communication PCB.

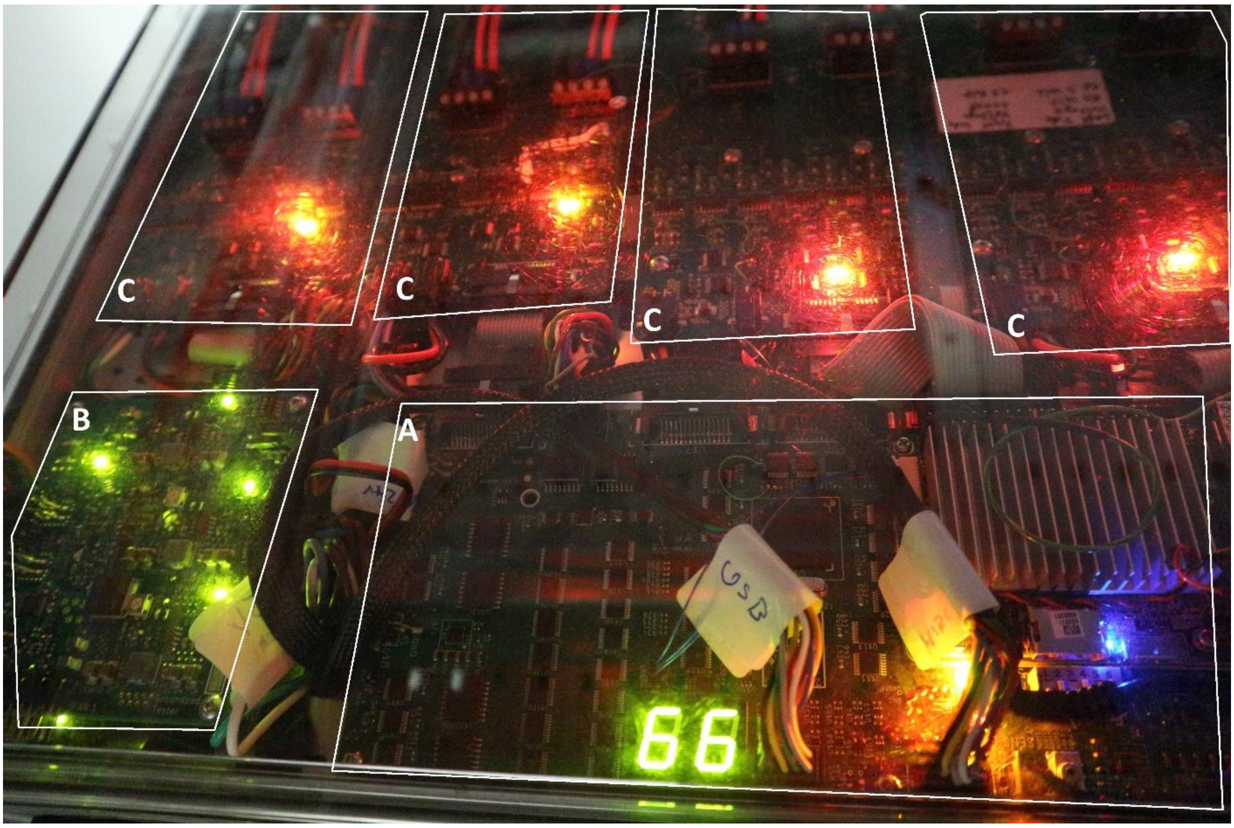

Figure S 12: Picture of the control unit. Due to space constraints, the perspective is a not optimal: Sections: A) Main Control PCB with the main control logic and communication capabilities. B) Power-control power delivery PCB. Since it was not entirely clear which voltage would be necessary for driving the control elements for the thermo-electrical elements, a variable power control was designed. C) Power control cards. These supply and transform the power from the main power supply to all thermo-electrical elements. The larger cards, on the right are an early version (V1) of the power control cards, while smaller cards on the left are more recent version (V4), with a more capable and efficient design, making use of TrenchFET® Gen IV MOSFETs (Vishay, United States). Due to the high efficiency of modern electronic ICs, this design did not use an extensive cooling of the electronics. Thus, the housing only required two 60 mm fans.

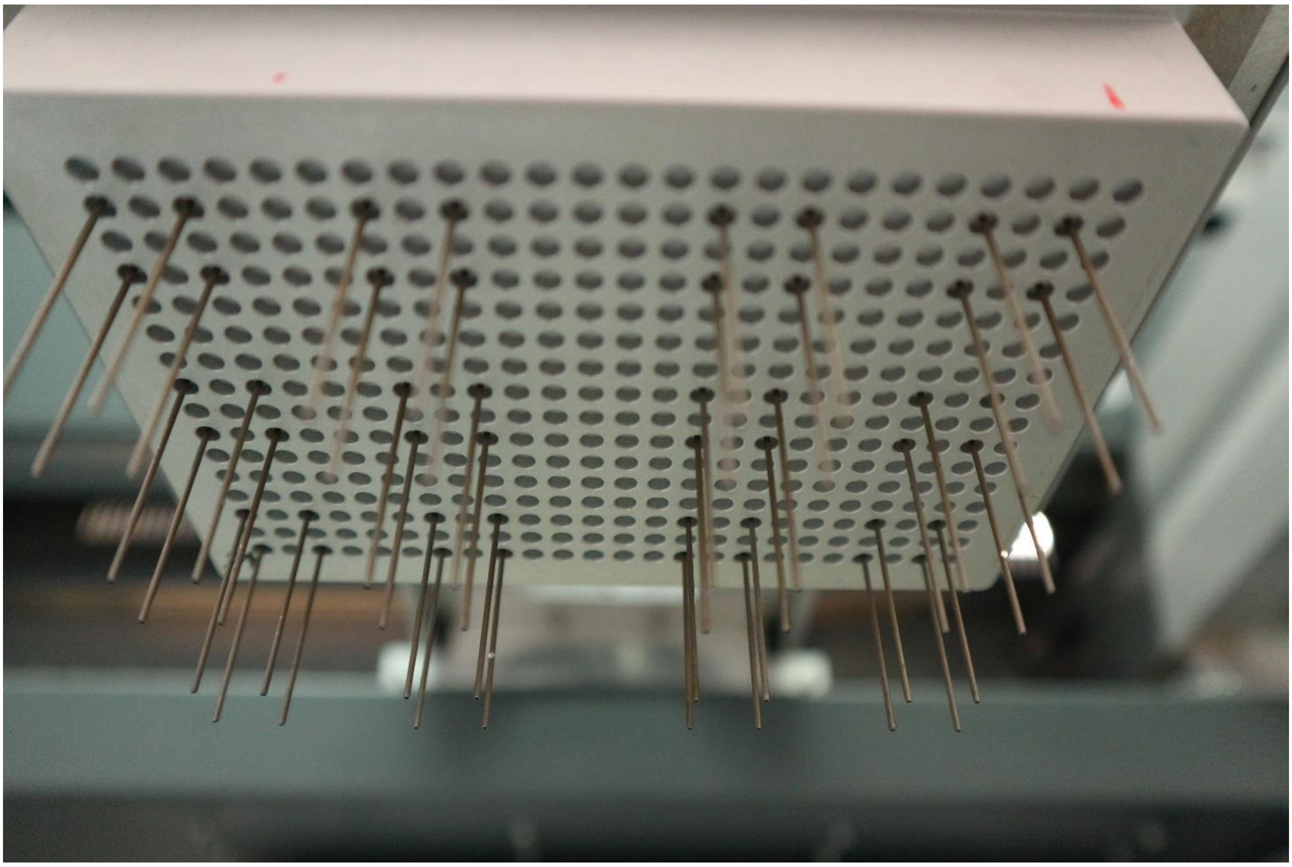

Figure S 13: Modified 384-needle head (Tecan, Switzerland). This head was modified to fit both 96 and 384-well applications. The use of fine needles allows for the safe storage of aspirated liquids within the needles, when the entire needle section is submerged in a cooling liquid without risk of contamination or dilution, provided a sufficient air gap is placed in the opening section of each needle.

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Figure S 14: The liquid handling setup. View from the front-left side.

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Figure S 15: The liquid handling setup from the back. The white styrofoam box holds the container with the cooling liquid used for the 384-needle cooling operation. Next to the white box is the used cooling device (Huber, Germany) for the cooling of the cooling liquid. Above the cooling setup is the plate reader (Tecan, Switzerland), seen from the back.

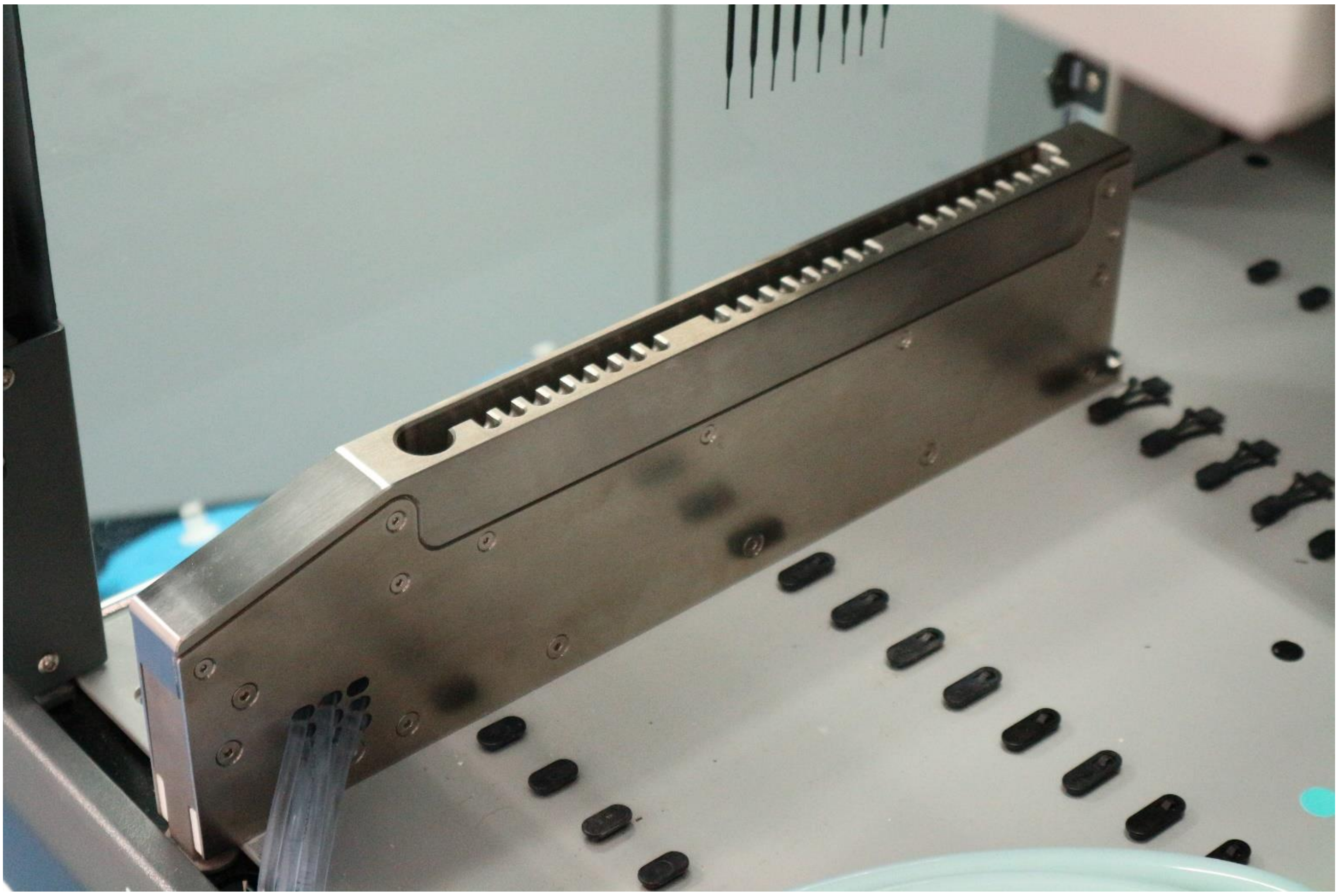

Figure S 16: Solvent washing station. This washing station is needed to remove oil residue from the 8 pipetting needles.

Figure S 17: Solvent pumps for the solvent washing station. Eight peristaltic pumps (Kamoer Fluid Technology, China) were used for this task. To reduce the risk of trapped air the pumps and all tubes for solvent were mounted at an angle.

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