# TheOnyx

## Smart Temperature Control with TheOnyx – any Temperature, any Position, any Time

### Summary

- Peltier control facilitates rapid cooling or heating of samples & reagents
- Modular designs enable endless plug and play configurations
- One position incubates at any temperature – cuts costs & saves space
- Smart software control & script writing is powerful but easy-to-use
- Risk of condensation on cooled positions is eliminated
- GLP traceability of set vs. actual temperature during a script run

### Peltier units facilitate cooling or heating

Reagent and sample temperature on TheOnyx are controlled via peltier elements **(Figure 1)**.

Peltiers are well-suited to the demands of the system, being flexible (temperature range 4 – 60°C), reliable, and very fast.

A wide range of vessel formats is supported, including 96- and 384-well microplates, flat microplates, and a selection of reagent racks. Customized designs also are available on request. Excess heat generated by peltier elements during operation is dissipated via a liquid cooling mechanism beneath each element, and an external chiller unit that recirculates actively cooled liquid through the system.

**Figure 1:** Peltier elements facilitate reagent or sample temperature control. The example shown is a modular reagent trough rack – the troughs are removable and the many possible trough combinations are user-configurable.



AVISO-Trade GmbH; Stockholmer Straße 10; D – 07747 Jena; CEO: Reinhard Herrmann; RG Jena: HRB 210244
Tel.: +49 (0) 3641 4820 0; Fax: +49 (0) 3641 4820 12; E-Mail: info@aviso–trade.com; Internet: www.aviso–trade.com

## The cooling / heating elements are sealed modular units

Each cooled or heated position is mounted in a metal casing and attached to a deck tray, forming a sealed unit. All cables and tubing are concealed within the casing, and up to three cooling / heating elements are mounted on each deck tray **(Figure 2)**. The units are in plug & play design – deck trays are simply placed on or lifted off the worktable **(Figure 3)** – allowing easy interchange of platform configurations and simple system upgrade options.

**Figure 2:** Up to three heating or cooling elements are mounted in a casing (top), which in turn is mounted on a deck tray

**Figure 3:** Deck trays are simply placed on or lifted off the TheOnyx's worktable

## Smart software control facilitates complete flexibility

The temperature of each cooled or heated position is controlled automatically from TheOnyx's RoboManager operating software. Each position has a default temperature that is defined when the robot system is first configured **(Figure 4)**.

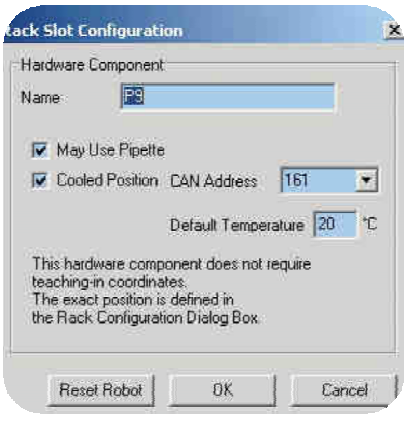
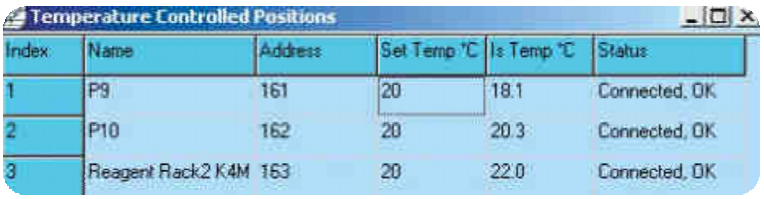



**Figure 4:** The default temperature is easily defined and amended if required

The default temperature is easily changed later on if desired. To change the temperature of a position during an application script, the user adds a 'Set Temperature" command to the script simply by clicking on the corresponding icon in the RoboManager graphical user interface. A dialog box opens within which the temperature of each slot is defined by the user **(Figure 5)**.




| Index | Name | Address | Set Temp °C | Is Temp °C | Status |
|---|---|---|---|---|---|
| 1 | P9 | 161 | 20 | 18.1 | Connected, OK |
| 2 | P10 | 162 | 20 | 20.3 | Connected, OK |
| 3 | Reagent Rack2 K4M | 163 | 20 | 22.0 | Connected, OK |

**Figure 5:** The user controls the temperature of each slot at every stage during the script run.

Then, an optional 'Wait for Temperature" command is inserted, again by simply clicking an icon. This command pauses the robot during a script run until the set temperature is reached.In practice this takes only a short time due to the rapid heating / cooling rates of the peltier elements.



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## Condensation on cooled positions is eliminated

A major disadvantage of continuously cooled sample positions is the tendency for condensation to form when the position is unoccupied by a trough, tube, or plate. Now the problem is eradicated with the smart software control feature. Active cooling on a reagent or sample position is only activated when needed during an application script, and should any condensation start to form this can be quickly vaporized by heating the position for a short time.

## During a script run TheOnyx continually monitors the temperature at each position

During a script run, a thread in the RoboManager software measures the actual temperature of each position relative to its set temperature at 5 second intervals. If the difference between the measured and the set values ever exceeds 2°C the user will be alerted by a warning line, inserted into the GLP report, indicating the precise time of deviation.

## Conclusion

Many molecular biological applications require sample cooling to prevent enzymatic reactions from proceeding unchecked, sample evaporation, and also degradation of precious samples or reagents. Other steps in the same process might require sample incubation at different temperatures to enable reactions to proceed or to elute nucleic acids from magnetic beads.

Temperature-controlled reagent or sample positions, therefore, are a key component of most automated molecular biology workstations. Now TheOnyx offers the end-user total flexibility in being able to select any temperature on any position during any part of an application script. In addition, the user benefits from speed, convenience, and ease of programming.



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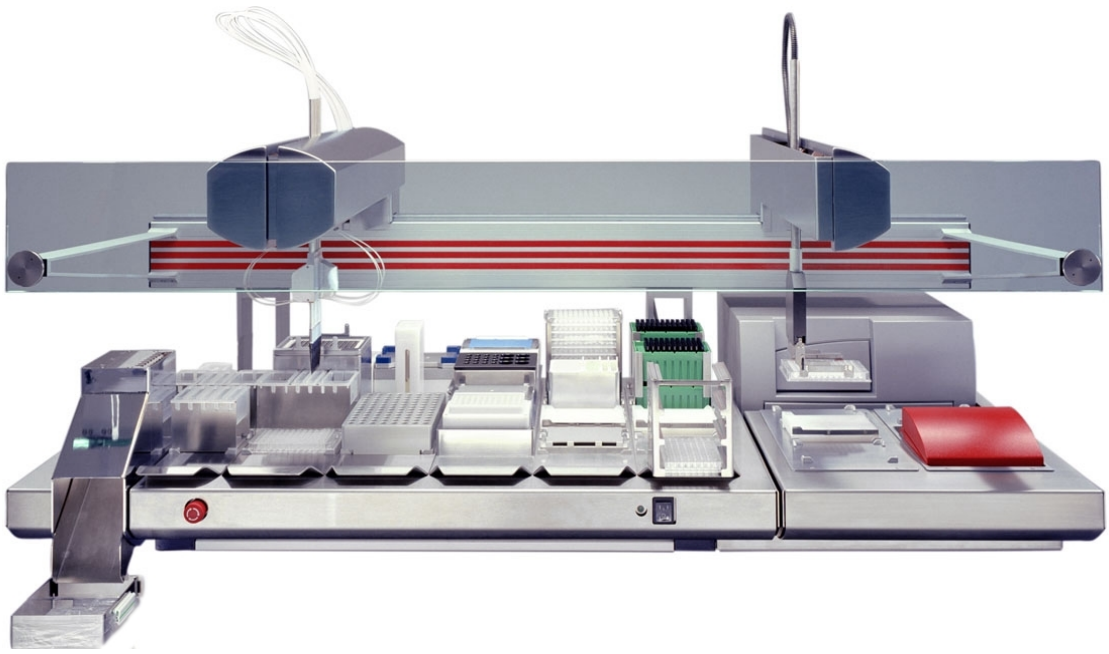
**For further information please contact the AVISO team at:**

**Tel.: +49 (0) 3641 4820 0**
**info@aviso-trade.com**





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