PRODUCT INFORMATION

No. P096

Air-cooled Peltier temperature module

When space and performance matter

Authors

Jint Nijman, Cornelia Küchenmeister-Lehrheuer,
Thermo Scientific Karlsruhe

Keywords

Peltier-effect, air-cooled,
Parallel-plate and cone-plate measuring geometries,
HAAKE MARS rheometer

The TM-PE-P Air module is designed for controlling the sample temperature in a parallel-plate or cone-plate rheometer measuring geometry [1], in the range of -5 °C to +200 °C. The module connects directly to the rheometer only, it does not need any external heat exchanger to work.

The TM-PE-P Air uses the Peltier-effect for temperature control and an integrated air-cooled heat-exchanger for counter cooling the Peltier-element. The compact module fits completely in the rheometer frame and does not require any additional lab bench space.

The TM-PE-P Air module is compatible with the Thermo Scientific™ HAAKE™ MARS™ rheometer models MARS iQ, MARS iQ Air, MARS 40 and MARS 60.

Just like all other TM-xx-x modules the TM-PE-P Air is equipped with a quick connect coupling connector and is automatically recognized by the MARS rheometer when connected.

Performance

The performance of the TM-PE-P Air is comparable with that of the liquid cooled TM-PE-P in combination with a passive heat exchanger like the HX R when looking at the temperature range of -5 °C to +150 °C, see Figure 2. For higher temperatures the max. heating is rate is lower.

The TM-PE-P Air offers heating and cooling rates of up to 40 °C/min.

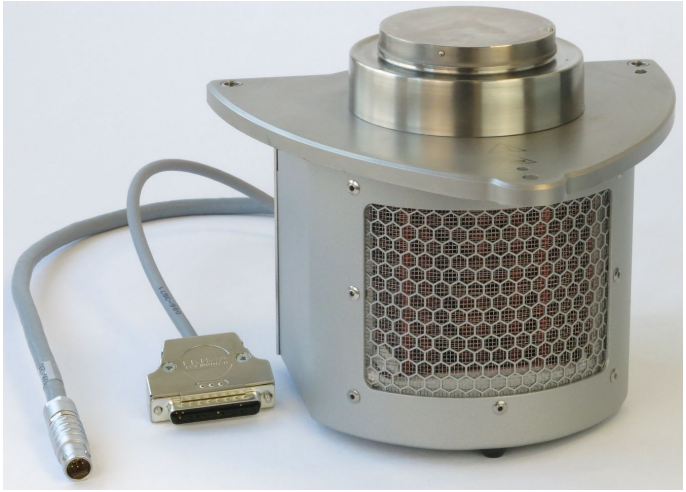


Figure 1. TM-PE-P Air front

Due to the air-cooling the lowest attainable temperature relates to the ambient temperature, -5 °C is comfortably reached in a lab environment at 23 °C.

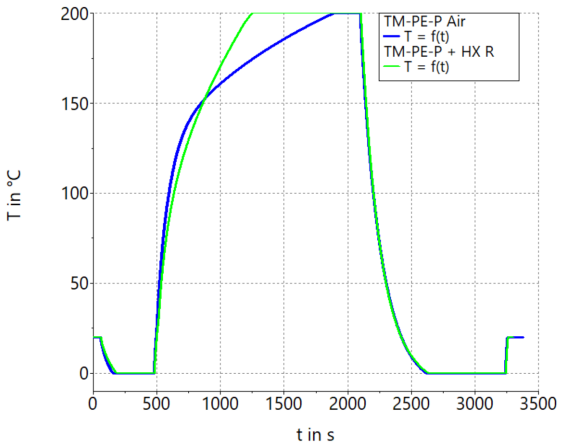


Figure 2. TM-PE-P Air performance

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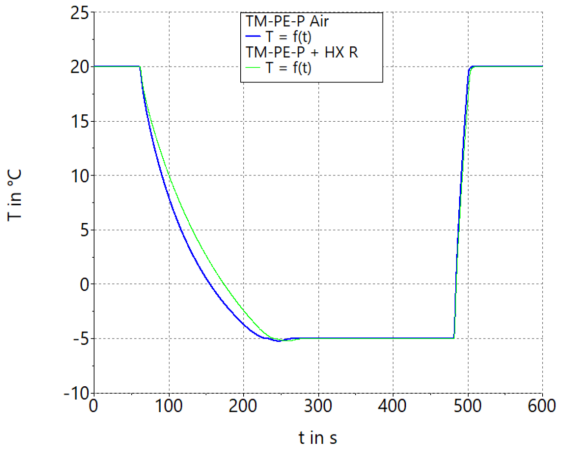


Figure 3. TM-PE-P Air performance

Figure 2 shows the performance of the TM-PE-P Air when heating up from 0 °C to 200 °C and cooling down to 0 °C again. Figure 3 shows the performance when cooling down from 20 °C to -5 °C and heating up to 20 °C again. In both Figure 2 and Figure 3 the data of the TM-PE-P Air (blue curve) is compared with that of the fluid cooled TM-PE-P + HX R heat-exchanger (green curve).

Design/Materials

The upper part of the module, on which the 3 mm thin exchangeable lower measuring plate is mounted, is made from Ampcoloy, a material with a very high thermal conductivity. This guarantees a homogeneous temperature distribution in the sample. The integrated air-cooled heat-exchanger consists of a set of heat-pipes, a stack of large cooling fins and a large speed-controlled fan.

Hoods

It is generally recommended to always use a hood (sample cover) [2] to improve temperature control and reduce the temperature gradient in the sample.

The TM-PE-P Air module can be used with the PEEK hood, the TM-IN-H insulated hood and the glass hood.

The TM-PE-P Air module can not be used with the TM-EL-H temperature controlled hood, since that hood needs water or compressed-air for cooling.



Figure 4. TM-PE-P Air back

TM-PE-P Air specifications

Property	Value
Min. temperature	-5 °C
Max. temperature	+200 °C
Max. heating rate	40 °C/min
Max. cooling rate	40 °C/min

Ordering information

Part	Order no.
TM-PE-P Air	222-2401
Power supply (MARS 40/60 only)	222-1897
Adapter cable for MARS iQ (Air) build before November 2019	006-4038
TM-PE-P Air compatibility update for MARS 40/60 build before May 2020	on request

References

[1] Küchenmeister-Lehrheuer C, Nijman J, Meyer F, Overview parallel plate and cone-plate geometries, Thermo Fisher Scientific Product information P029.

[2] Küchenmeister-Lehrheuer C, Nijman J, Meyer F, Overview sample covers with integrated solvent trap, Thermo Fisher Scientific Product information P035

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