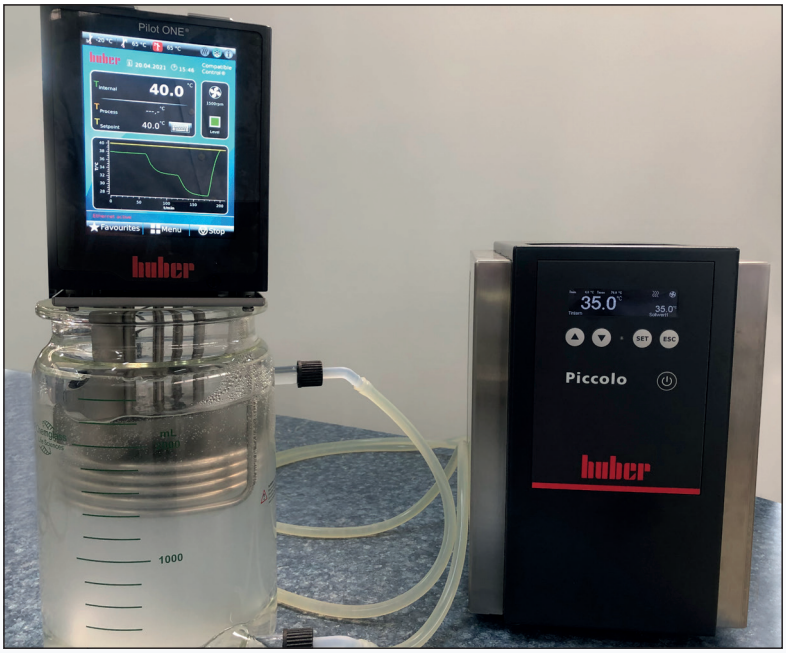
Huber Piccolo

The Piccolo controls a simulated bio-reaction using a CC-E Immersion Heater



Requirement
This case study demonstrates its ability to control a simulated bio-reaction using a CC-E Immersion Heater.

Setup details

Unit

Temperature range:	+4°C...+70°C
Cooling power:	0.28 kW @ +20°C
Heating power:	0.4 kW
Pump data:	1.7 l/m / 0.8 bar

Reactor

Manufacturer:	Chemglass
Volume:	3 l
Type:	Jacketed, flat-bottom Bioreactor

Test conditions

HTF:	Water
Reactor content:	2 l water
Bioreaction "simulator":	CC-E Immersion Heater
Stirrer speed:	CC-E pump set to 150 rpm
Amb. temperature:	+23°C

Results

1. Performance:
The Piccolo is a Peltier based chiller/heater designed for simple bench-top applications. This case study demonstrates its ability to control a simulated bio-reaction using a CC-E Immersion Heater with the 2kW heater adjusted to 5% (100w) for one set of tests and then 3% (60w) for a second set of tests.
A set-point of 40°C was entered into the CC-E unit to keep the heater on continually.
In the picture of the set-up below, the set-point and the actual temperature of the simulated bio-mass is graphically and numerically displayed on the screen of the Pilot ONE controller: the set-point is the yellow line (40°C) and the simulated bio mass temperature is the green line.
The graphics show the response of the Piccolo to hold the jacket and the process stable at each set point:

Heater at 100w

Piccolo Set Point	Actual	Process (displayed on the CC-E)	Delta-T
35°C	35°C	40°C	5K
30°C	30°C	37.9°C	8K
25°C	25°C	33°C	8K
20°C	20°C	28°C	8K

Heater at 60w

Piccolo Set Point	Actual	Process (displayed on the CC-E)	Delta-T
35°C	35°C	39.7°C	4.7K
30°C	30°C	34.8°C	4.8K
25°C	25°C	30.0°C	5.0K
20°C	20°C	24.9°C	4.8K

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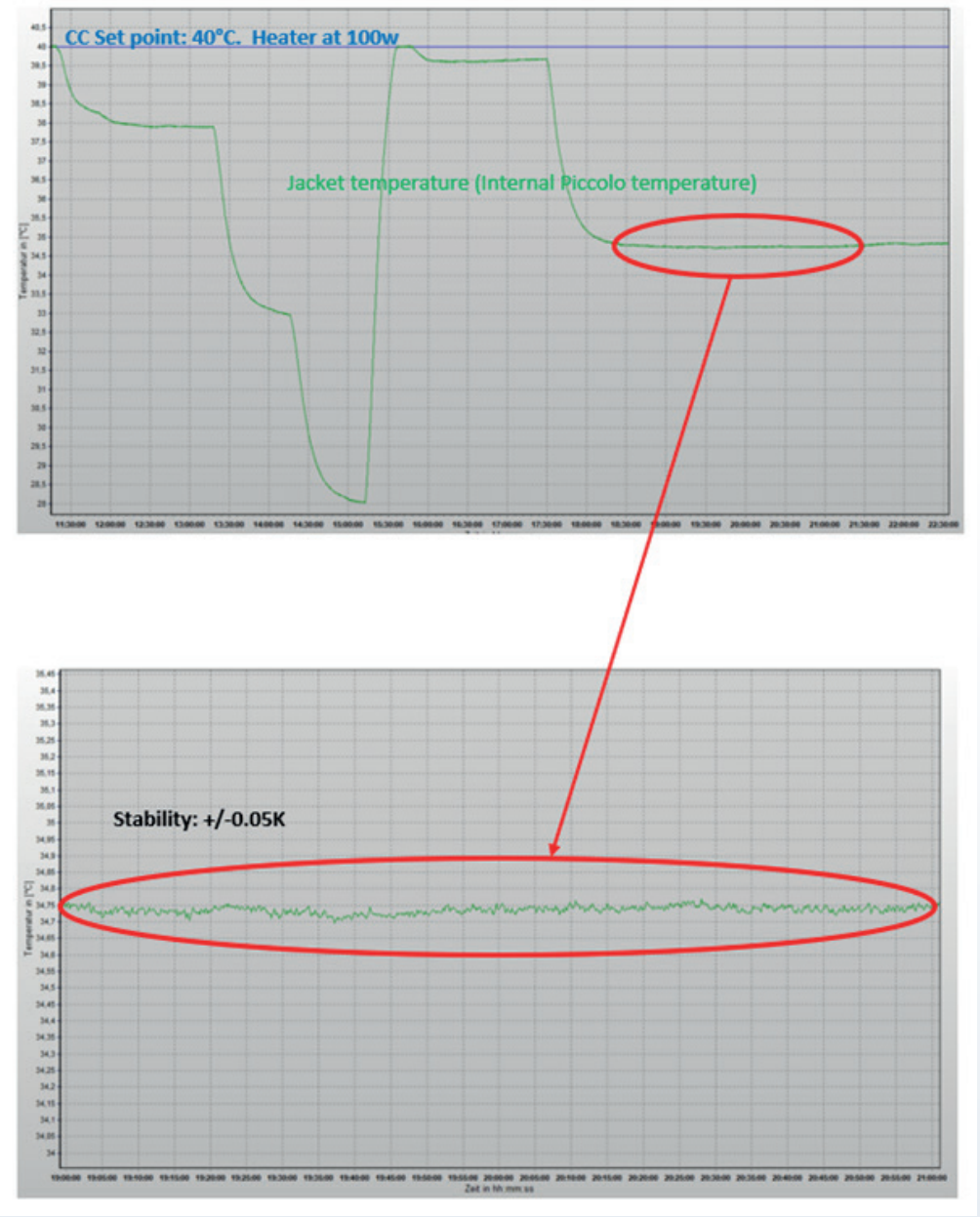
2. Stability:
The graphics below show the thermal stability of the reaction mass as the Piccolo maintains an appropriate Delta-T between the jacket and the reaction mass to remove the heat energy generated by heater on the CC-E immersion heater.
A process temperature stability of +/- 0.05K (°C) is clearly demonstrated.



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