

HEIDOLPH SYNTHESIS 1

Aim:

The motivation of the case study was to test Heidolph's modular SYNTHESIS 1-system for solid phase and liquid phase as well as for evaporating with a basic unit, in order to gain results concerning the lowest achievable temperatures within the SYNTHESIS 1 using different JULABO refrigerated circulators.

These results allow for a conclusive statement concerning the selection of suitable JULABO circulator solutions for the SYNTHESIS 1.




Test description:

ASYNTHESIS 1 from Heidolph in the following configuration was used for the tests:

- Heidolph Synthesis 1 LIQUID basic unit
- Reaction body LIQUID 16, for 16 reaction vessels 25ml ea.
- Protection cover, plastic



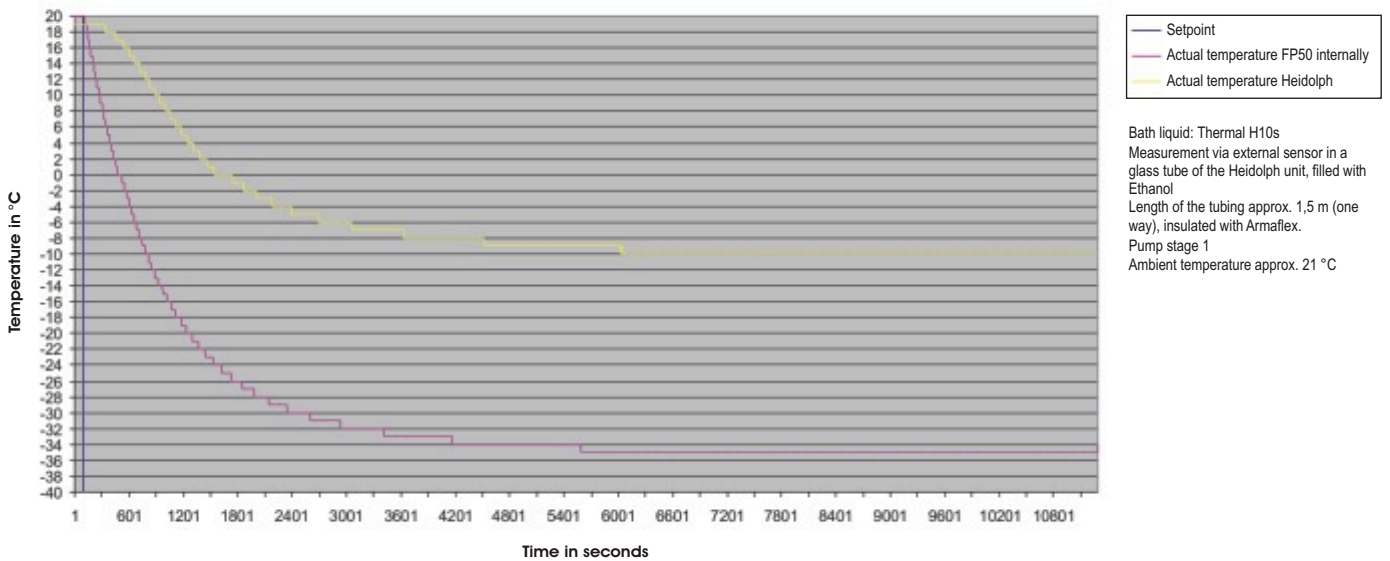
	JULABO FP50-HE	JULABO Presto LH85	JULABO FW95-SL
Used bath medium :	JULABO-Thermal H10S	JULABO-Thermal HL80	Ethanol
<i>More details: http://www.julabo.de/jgmbh/english/produkte/index.htm</i>			
Temperature value measurement and -control:	ext. Pt100 sensor within a test tube of the SYNTHESIS 1, filled with Ethanol	ext. Pt100 Sensor within a test tube of the SYNTHESIS 1, filled with Ethanol	ext. Pt100 sensor within a test tube of the SYNTHESIS 1, filled with Ethanol
Connection tubing Circulator to SYNTHESIS 1:	2 x 1,5m metal tubing M16x1, triple insulated with insulated connections	2 x 1,5m metal tubing M16x1, triple insulated with insulated connections	2 x 1,5m metal tubing M16x1, triple insulated with insulated connections
Pump stage:	1 (22 l/min - 0,4 bar pressure - 0,2 bar suction)	1 (24 l/min - 0,8 bar pressure))	1 (22 l/min - 0,4 bar pressure - 0,2 bar suction) 4 (26 l/min - 0,7 bar pressure - 0,4 bar suction)

	 JULABO FP50-HE	 JULABO Presto LH85	 JULABO FW95-SL
Test No. 1			
Ambient temperature:		ca. 21°C	
Reachable minimum temperature in the SYNTHESIS 1:	ca. -10°C		
Cool-down time from RT (+20°C):	ca. 1h 40 min		
Test No. 2			
Ambient temperature:	ca. 24°C		
Reachable minimum temperature in the SYNTHESIS 1:	ca. -7°C		
Cool-down time from RT (+20°C):	ca. 1h 40 min		
Test No. 3			
Ambient temperature:	ca. 20°C		
Reachable minimum temperature in the SYNTHESIS 1:		ca. -32°C	
Cool-down time from RT (+20°C):		ca. 50 min	
Control of Heidolph SYNTHESIS 1		OUT	
Test No. 4			
Ambient temperature:		ca. 23°C	
Reachable minimum temperature in the SYNTHESIS 1:		ca. -32°C	
Cool-down time from RT (+20°C):		ca. 22 min	
Control of Heidolph SYNTHESIS 1		set to -30°C from start	
Test No. 5			
Ambient temperature:		ca. 23°C	
Reachable minimum temperature in the SYNTHESIS 1:		ca. -35°C	
Cool-down time from RT (+20°C):		ca. 27 min	
Control of Heidolph SYNTHESIS 1		OUT when cooling, else SYNTHESIS 1 at -30°C	
Test No. 6			
Ambient temperature:			ca. 21,2°C
Reachable minimum temperature in the SYNTHESIS 1 at Pump level 1 :			ca. -42,6°C
Cool-down time from RT (+20°C):			ca. 1h 44 min
Reachable minimum temperature in the SYNTHESIS 1 at Pump level 4 :			ca. -47,9°C
Cool-down time from RT (+20°C):			ca. 2h 20 min
Control of Heidolph SYNTHESIS 1			OUT

Cool-down curves for the different tests

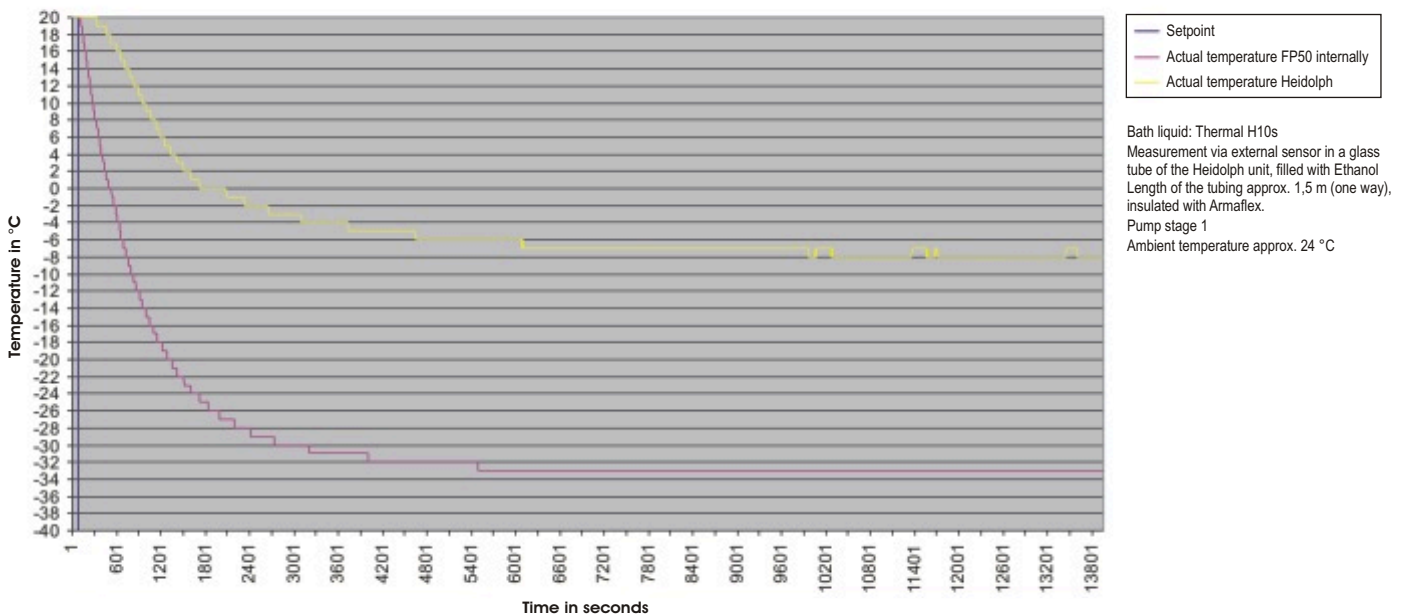
Test No. 1:

Heidolph Synthesis 1 cool down curve with FP50-HE



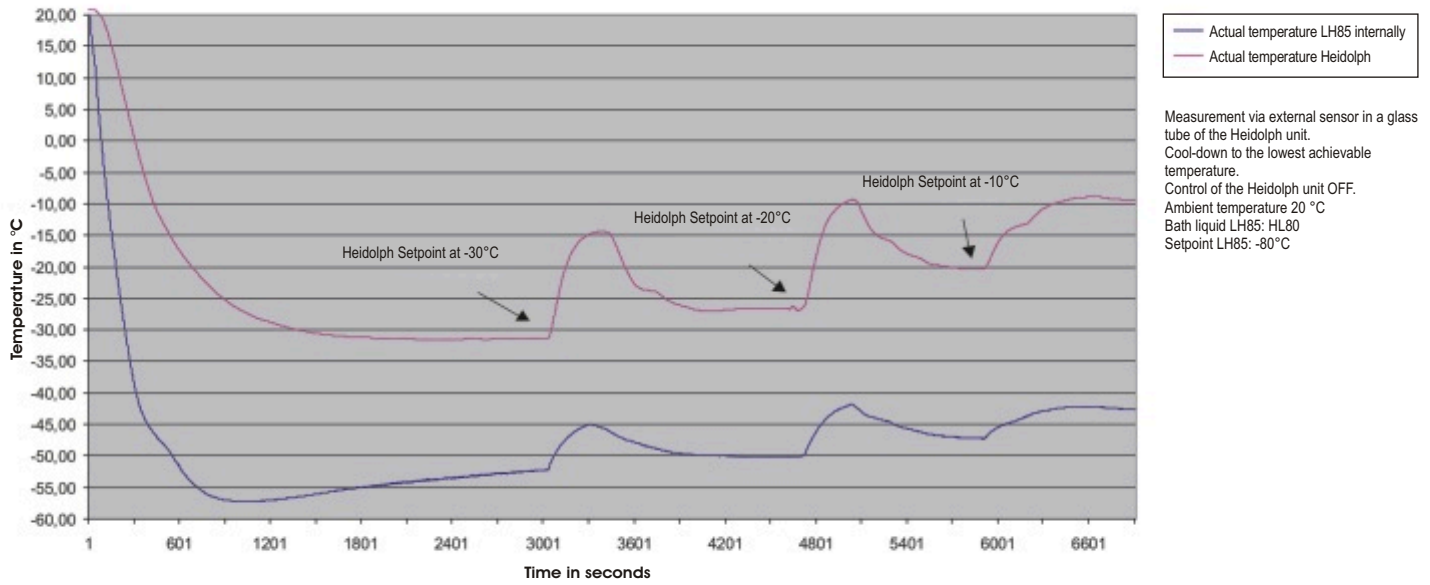
Test No. 2:

Heidolph Synthesis 1 cool down curve with FP50-HE



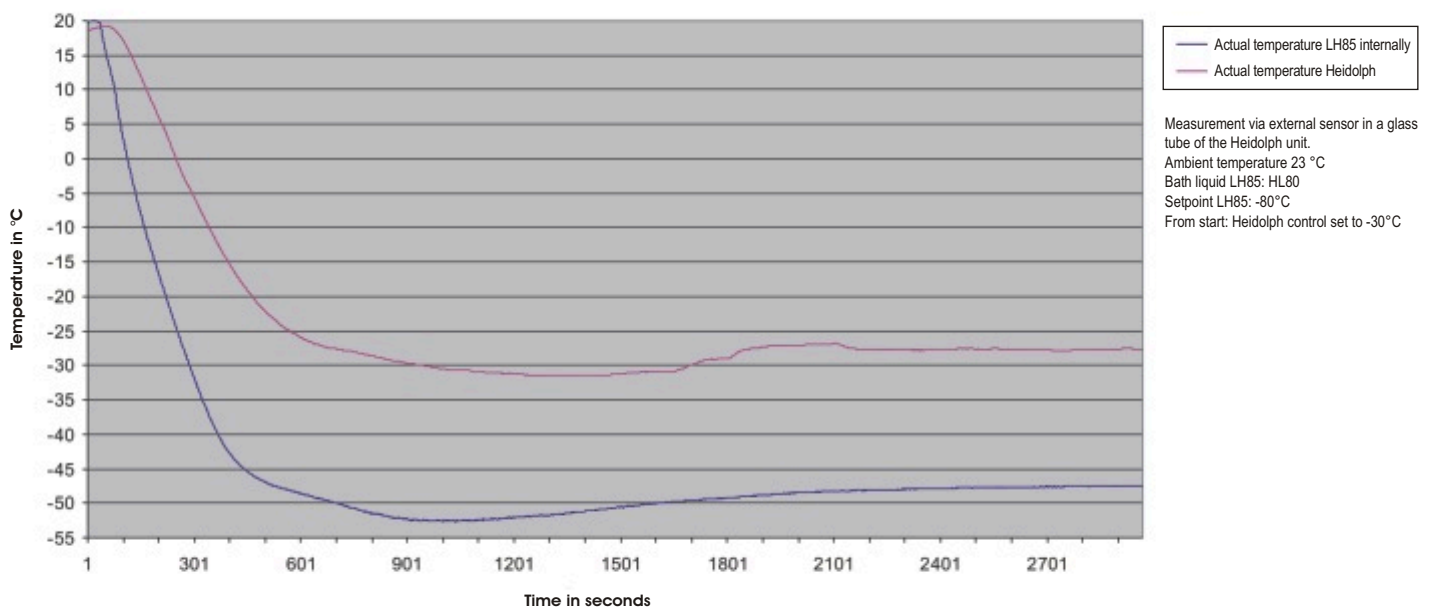
Test No. 3:

Heidolph Synthesis 1 cool down curve with LH85



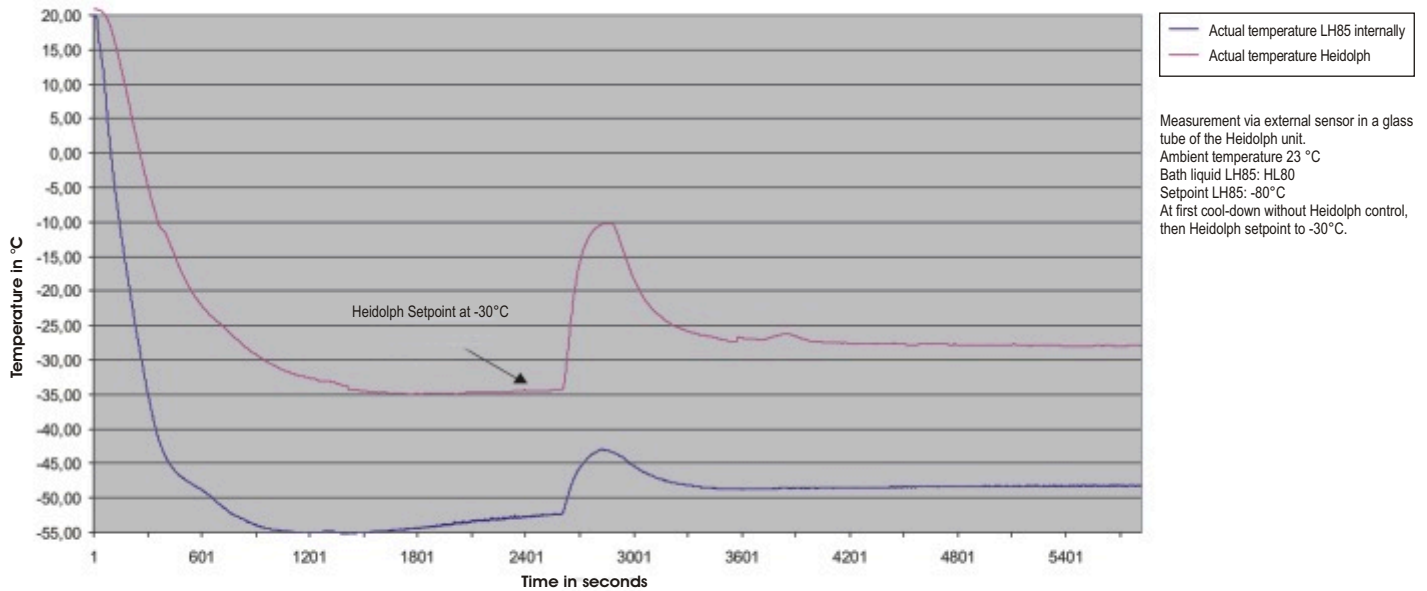
Test No. 4:

Heidolph Synthesis 1 cool down curve with LH85



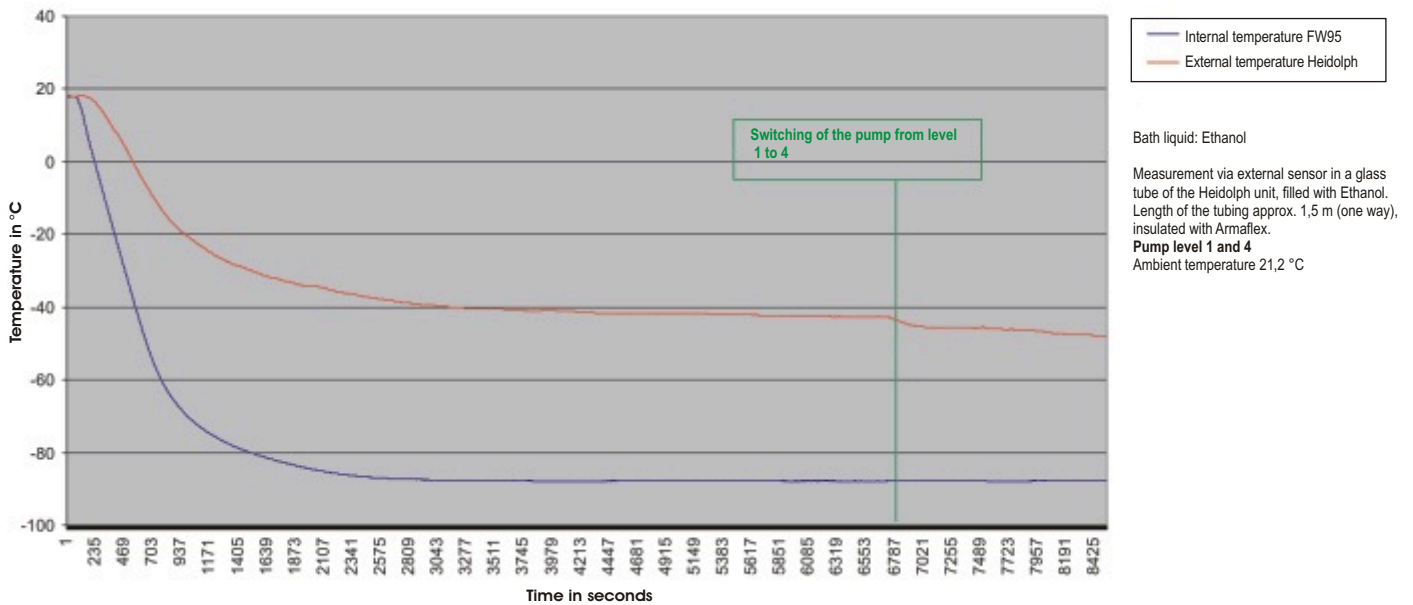
Test No. 5:

Heidolph Synthesis 1 cool down curve with LH85



Test No. 6:

Heidolph FW95-SL (pump level 1 + 4)



Recommendation

		Order-no.	Model
Option I:	Down to -10 °C in Synthesis 1	9 210 650	FP50-HE
Option II	Down to -30 °C in Synthesis 1	9 410 185	LH85
Option III:	Down to -45 °C in Synthesis 1	9 350 796N	FW95-SL
Accessories for:	Quantity	Order-no.	Description
	2	8 930 211	1.5 m metal tubing M16x1
Option I - III	2	8 930 214	3 m metal tubing M16x1
	1	8 850 001	Connection kit JULABO-circulator and Synthesis1*

* Due to material incompatibility the connection kit should only be employed in permanent operation an a minus temperature range only up to -40° in the Synthesis 1.