

Sunamp

Heat Batteries

Sunamp designs, produces and sells non-toxic, compact, highly efficient Heat Batteries that can be used to store heat for a number of applications including many renewable and low carbon technologies. Sunamp's experience in Heat Battery technology and related systems will make significant improvements to the efficiency and sustainability of vehicles on the road.

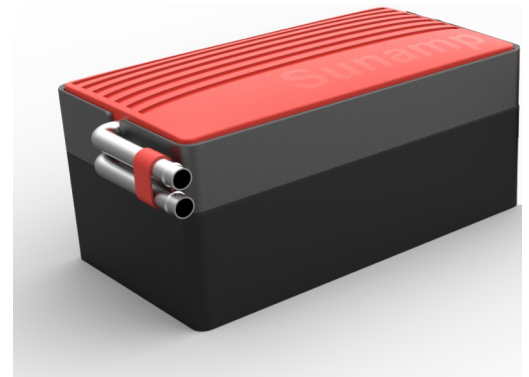
Sunamp Heat Batteries are equipped with high power heat exchangers that can support one or multiple fluid circuits (water, glycol, oil, refrigerant, etc.) for quickly charging the heat batteries and then rapidly extracting and delivering heat from them. This makes them suitable for a wide range of heat recovery, storage and re-use applications on vehicles.

Data Sheet for Sunamp Phase Change Material – SU83

Composition	Strontium Bromide hexahydrate	
(Patent pending formulation)	And additives – infinite cycle life	
	Nucleators – always freezes at 83°C	
Phase Change Temperature	Melt	83°C
	Freeze	83°C
Maximum Temperature	125°C	
Density	Liquid (95°C)	2.18 kg/litre
	Solid (20°C)	2.39 kg/litre
Cycle lifetime	No degradation – unlimited cycles	
Flammability	Not flammable – extinguishes flames	
Viscosity	< 83°C	Solid
	> 83°C	Free flowing liquid
Material compatibility	Copper, Brass – no corrosion	
	Metal or engineering plastic	
Latent Heat of Melting/Freezing	105 kJ/kg	229 kJ/litre
Specific Heat Capacity	Solid	1.5 kJ/kg/K
	Liquid	4.1 kJ/litre/K
Stored energy	70°C to 95°C	147 kJ/kg
		89 Wh/litre

Engine Warmup heat battery key features

- ✓ Provide fast warmup of engine components and fluids
- ✓ Reduce emissions
- ✓ Improve fuel economy
- ✓ Make use of recycled heat
- ✓ Compact packaging
- ✓ Rapidly customized size, shape, capacity
- ✓ Modular – linear energy & power with cells
- ✓ Excellent energy density
- ✓ Exceptional power density
- ✓ Best safety – non-flammable, non-toxic



Data Sheet for Sunamp Heat Battery – Accelerated Engine Warmup

PCM	SU83	
Power (per cell)	Discharge	>50 kW
	Sustained Charging	>50 kW
Energy	70°C to 95°C	356 Wh per cell
Internal Volume	PCM	4.0 Litres
Max Temperature	Continuous	120°C
	Short Term	125°C
Casing	Metal and plastic	
Weight	15 kg (tbc)	
Recyclability	Designed for easy re-manufacture / total recycle	
Dimensions	Height	190mm
	Depth	175mm
	Width	315mm

Note: Dimensions and capacity are fully adjustable to OEM/Tier 1 requirements.

Edinburgh Headquarters

Sunamp Ltd
1 Satellite Park
Macmerry
EH33 1RY
United Kingdom
UK: +44 (0)1875 610001

Zurich Office

Sunamp Switzerland GmbH
glaTec, Technologiezentrum an der Empa
Überlandstrasse 129
8600 Dübendorf
Switzerland
Zurich: +41 (0) 799 619761



Sunamp

Heat Batteries

Sunamp designs, produces and sells non-toxic, compact, highly efficient Heat Batteries that can be used to store heat for a number of applications including many renewable and low carbon technologies. Sunamp's experience in Heat Battery technology and related systems will make significant improvements to the efficiency and sustainability of vehicles on the road.

Sunamp Heat Batteries are equipped with high power heat exchangers that can support one or multiple fluid circuits (water, glycol, oil, refrigerant, etc.) for quickly charging the heat batteries and then rapidly extracting and delivering heat from them. This makes them suitable for a wide range of heat recovery, storage and re-use applications on vehicles.

Data Sheet for Sunamp Phase Change Material – SU121

Composition	Undisclosed formulation		
Phase Change Temperature	Melt	121°C	
	Freeze	115°C	
Maximum Temperature	160°C		
Density	Liquid (95°C)	1.3 kg/litre	
	Solid (20°C)	1.45 kg/litre	
Cycle lifetime	Low degradation – high cycle life		
Flammability	Low		
Viscosity	<115°C	Solid	
	>123°C	Free flowing liquid	
Latent Heat of Melting/Freezing	310 kJ/kg	403 kJ/litre	
Specific Heat Capacity	Solid	1.4 kJ/kg/K	1.8 kJ/litre/K
	Liquid	2.6 kJ/kg/K	3.4 kJ/litre/K
Stored energy	70°C to 150°C	458 kJ/kg	596 kJ/litre
		127 Wh/kg	165 Wh/litre

Cabin air heat system concept key features

- ✓ Warm and dehumidify air
- ✓ Recharge from mains electricity
- ✓ Avoids using battery power during drive cycle
- ✓ Reduce cab heater impact on electric vehicle range
- ✓ Compact packaging
- ✓ Rapidly customized size, shape, capacity
- ✓ Excellent energy density
- ✓ Exceptional power density



Data Sheet for Sunamp Heat Battery – Cabin air heat system concept (Heat battery section)

PCM	SU121		
Power (per cell)	Discharge	>10 kW	
	Sustained Charging	>10 kW	
Internal Volume	PCM	17.0 Litres	
Energy	2800 Wh		
Max Temperature	160°C		
Casing	Metal or engineering plastic		
Weight	33 kg (tbc)		
Recyclability	Designed for easy re-manufacture / total recycle		
Dimensions	Height	150mm	
	Fully customisable Depth	400mm	
	Width	600mm	

Note: Dimensions and capacity are fully adjustable to OEM/Tier 1 requirements.

Edinburgh Headquarters

Sunamp Ltd
1 Satellite Park
Macmerry
EH33 1RY
United Kingdom
UK: +44 (0)1875 610001

Zurich Office

Sunamp Switzerland GmbH
glaTec, Technologiezentrum an der Empa
Überlandstrasse 129
8600 Dübendorf
Switzerland
Zurich: +41 (0) 799 619761

