

## Efficiency is Everything

Carbon footprint reduction is a key component of data center sustainability efforts. Engine heaters on standby generators are an untapped source for energy efficiency. With a retrofit of Hotstart's CVC High Efficiency Engine Heater, end-users can see reduction in energy draw by up to 70% through the use of variable speed air-source heat pump technology.

### CVC

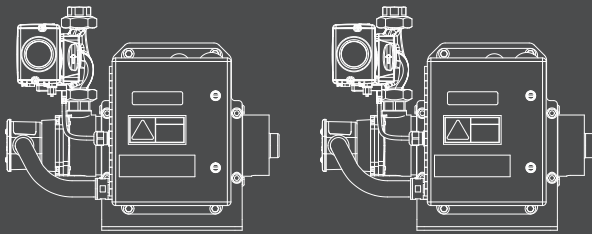
Heat Capacity:  
Up to 10 kW  
GenSet:  
1 MW and larger  
Refrigerant:  
HFC-32  
Total FLA:  
Up to 20A



  
Certifications Pending

## Existing Heaters

Reliable redundancy is achieved by plumbing the CVC in series with the existing engine heaters installed by the genset OEM. These resistance heaters work in tandem with the CVC through fully integrated and programmed controls, assuring gensets are properly heated at any ambient temperature. The testing enclosure contained two Hotstart CSM 12kW forced circulation heaters.



### CSM

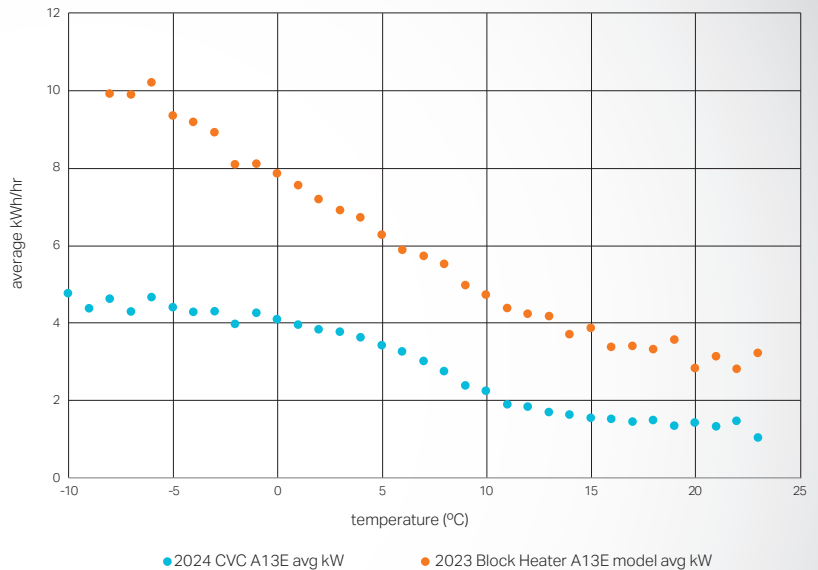
Wattage:  
12,000 W (12 kW)  
Circulation Method:  
Forced Circulation  
Set Temperature:  
100 °F (on) / 120 °F (off)

## Testing

The site has five generator enclosures, each with an MTU Series 4000, 12-cylinder engine with two 12 kW block heaters per genset. One generator was retrofit with a CVC engine heater, which was plumbed in series with the existing two heaters.

Following a "whole facility" approach, hourly energy usage and coolant temperature was collected for the entire genset enclosure rather than data specific to the individual engine heater performance. Data collected during the test period was compared to a full year of 2023 historical data for that genset provided by the site owner. The only change to the genset enclosure between 2023 and 2024 was the installation of the CVC. Energy usage of the CVC was calculated based on the difference between 2023 enclosure energy usage and 2024 enclosure energy usage for each 1 °C outside temperature bin. Hourly weather temperature was downloaded from a weather station in Børup Denmark.

CVC Genset Enclosure vs Block Heater Enclosure



## Energy Analysis

The CVC engine heater consumed on average 3.2 kWh/hr at 5 °C versus 6.5 kWh/hr for the existing heaters during the testing period of January 2024 to August 2024. Based on this data annualized from site data from 2023 and weather data for Børup Denmark, the CVC is expected to provide an estimated annual savings of 25,700 kWh or 53% of the block heaters energy usage.

	Heat Pump	Block heaters	Savings
<b>Model predicted kWh consumed based on 2023</b>	22,800 kWh	48,500 kWh	25,700 kWh (53%)