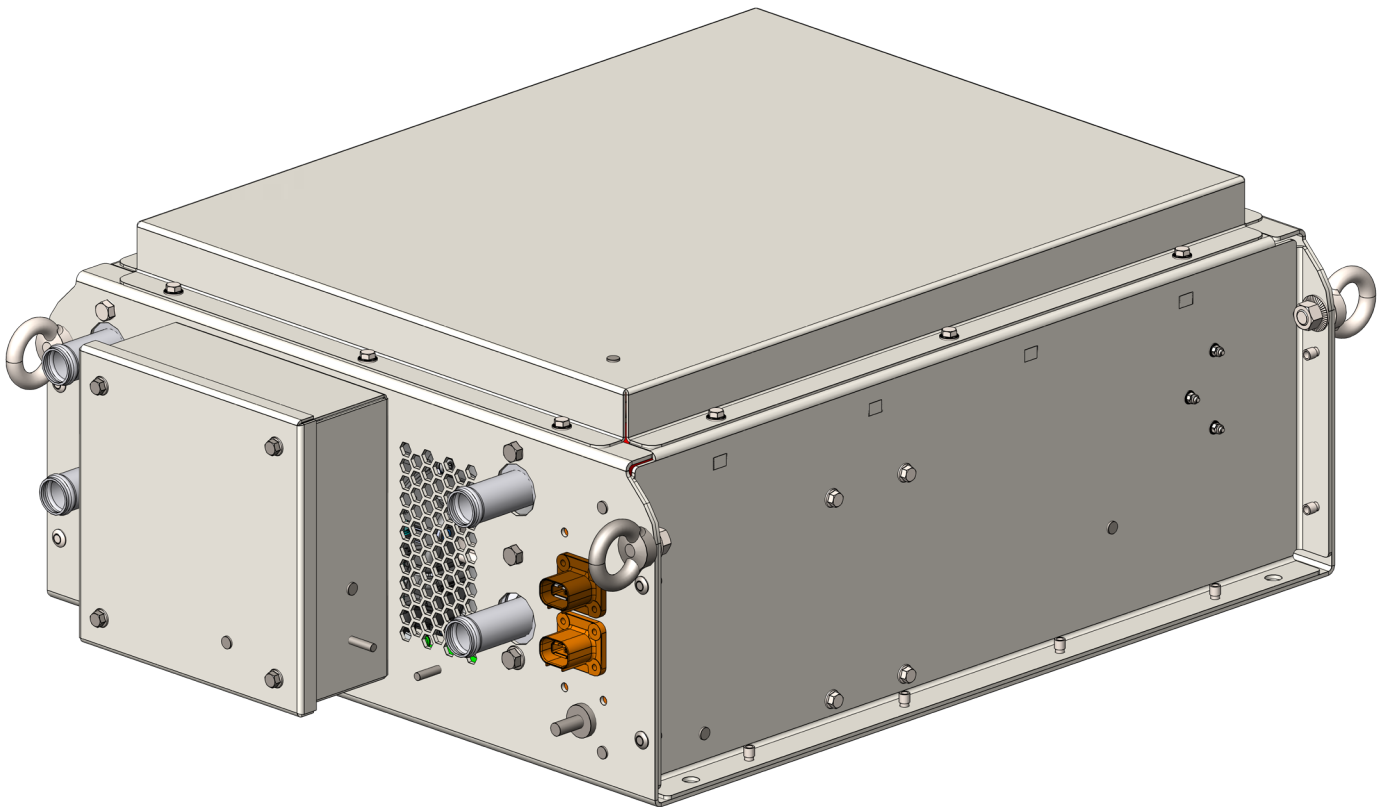


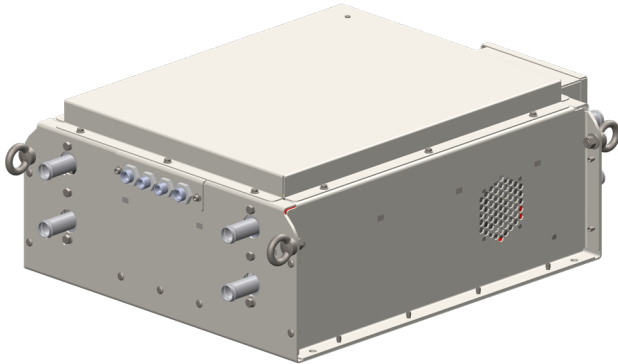
# COMPLETE THERMAL MANAGEMENT SYSTEM (CTMS)

generations of knowledge



SPECIFICATION & TECHNICAL INFORMATION

# Configurable thermal module for cabin, powertrain & batteries



## FUNCTIONS:

- Battery heating
- Battery cooling
- Powertrain cooling
- Cabin heating
- Cabin cooling
- Cabin dehumidification

*Configuration can be selected based on vehicle requirements*

## SYSTEM INTRODUCTION

OEMs can now offer fleet operators heating and cooling systems tailored to suit their specific geographical climates, reducing the need for complex platform variations with the Complete Thermal Management System (CTMS).

Whether utilised for battery electric or hydrogen fuel cell applications, our modular CTMS seamlessly integrates cabin HVAC, battery thermal management and powertrain cooling within a single unit.

Designed as a singular packaging solution, all CTMS variants are manufactured within the same envelope. This considered approach enables OEMs to offer a variety of thermal system configurations that precisely cater to end-users' needs while only requiring the CTMS to be packaged once.

## ABOUT THE SYSTEM

**The CTMS is a highly efficient heat pump with reverse function for battery thermal management and cabin air conditioning.**

The compact assembly can deliver precise regulation of the battery and electric motor temperatures, while also providing heating and air conditioning for the driver cabin.

If the heat pump functionality is incorporated into the CTMS module for cabin climate control, then a passive cooler for the battery is required.

The integrated system also utilises waste heat generated within the powertrain components to heat the cabin, therefore increasing total system efficiency while reducing power input consumption.

## KEY BENEFITS

**Customisation without additional cost:** The standardised packaging and modular design provides configurable adaptability without the need for multiple thermal management platform variations.

**Compact and flexible design:** The small footprint of the single integrated unit saves valuable space while indirect condensing provides further packaging flexibility.

**Simplified plug-and-play integration:** Supplied pre-assembled and pre-charged with refrigerant (depending on specification) for quick and seamless vehicle integration.

**Ultra-efficient performance:** Advanced heat recycling functionality and intelligent control software minimises power consumption while still delivering up to 12kW cooling and 18kW heating.\*

*\*12kW cooling capacity up to outside 45°C ambient and 18kW heating down to outside -25°C ambient temperature*

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## KEY FEATURES

- -25°C to +45°C operating range
- 12kW cooling capacity / 18kW heating capacity
- Suitable for BEVs and FCEVs
- Multiple system configurations to meet fleet operators' requirements
- Standard 'one-size-fits-all' physical system packaging
- "Plug and play" solution
- Fully integrated refrigerant system with innovative refrigerant manifold design
- Electric Water Pumps integrated into the unit
- CAN/LIN control direct to vehicle network

## APPLICATIONS

- Bus and Coach
- Commercial Vehicles (HGV) / Sleeper Cabs
- Off-highway (Agriculture / Construction / Mining)
- Special Vehicle
- Defence

*The CTMS can suit a range of applications. Contact us today at [www.graysonts.com](http://www.graysonts.com) to see how we can support your project*

## TECHNICAL SPECIFICATIONS

Operating range	-25°C to 45°C
Maximum cooling capacity (kW) up to: outside temperature (°C)	12kW 45°C
Maximum heating capacity (kW) up to: outside temperature (°C)	18kW -25°C
Operating voltage	High Voltage: 450V DC – 860V DC Low Voltage: 18V DC – 32V DC
HV DC Maximum power consumption	18kW / 20A @ 800V DC*
LV DC Maximum power consumption	2kW / 80A @ 24V DC*
Maximum weight (without coolant) (kg)	45kg – 55kg**
Dimensions L x W x H (mm)	857 x 600 x 300
Refrigerant type Charge weight (kg)	R134a, R1234yf (R513A compatible) 1.2kg
Connector types (High voltage (4-Pin)) Control Protocol via CAN J1939	High Voltage – 2 X HVA280 Low Voltage – 6-pin Deutsch
Outlet size O.D. (mm)	28mm
Anti-vibration mounts	Yes***
Integrated water pumps	Option for magnetic drive

\* High voltage and low voltage power consumption excludes the radiator fans

\*\* The specifications are approximations and can be subject to change, depending on the system configuration

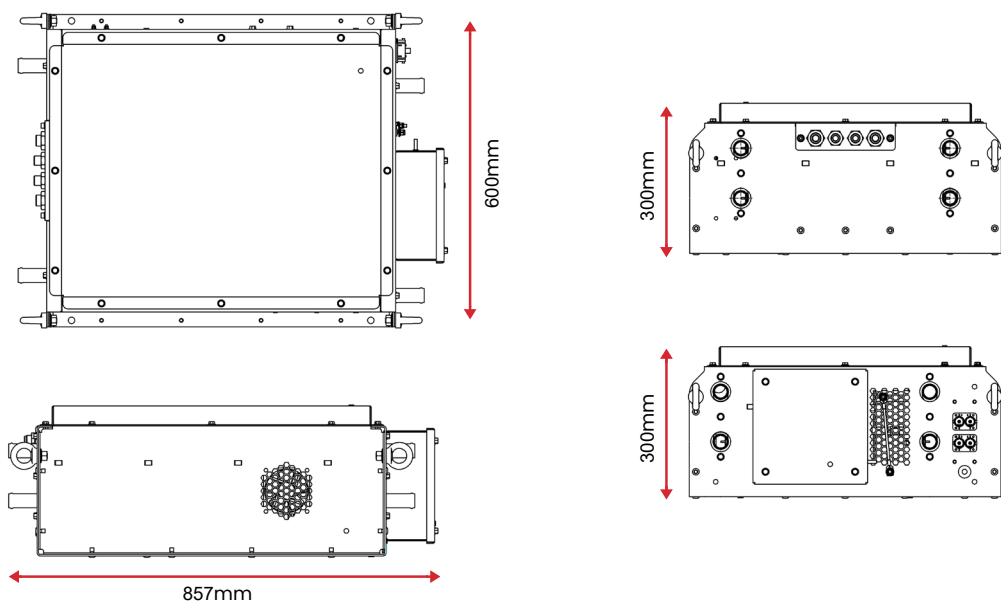
\*\*\* Anti-vibration mounts are for the compressor only

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# DIMENSIONS



# SYSTEM LAYOUT

