



November 1, 2023
Sanden Corporation

Japan Mobility Show 2023 Our booth introduction

We are now exhibiting our products at the JAPAN MOBILITY SHOW 2023 under the concept of "Create THE FUTURE SCENES" at Tokyo Big Sight from October 28 (Sat) to November 5 (Sun) 【The date open to public】 as already announced.

What is Create THE FUTURE SCENES

It has the meaning that we use "cooling and warming" and thermal management technologies not only for mobility, but also in all situations of people and society to deliver comfortable "SCENES".

This time, we introduce our booth and our latest products being exhibited at this exhibition. We hope that both those who can visit and cannot visit this exhibition can deepen your understanding about the future we will deliver through the following contents.

■Our Booth Introduction

In our booth you can experience 5°C cold water and 40°C warm water made by Integrated Thermal Management System (ITMS) by touching them with your own "hands". Also the spot cooler installed in the small EV allows visitors to experience a cool breeze with a temperature of -15°C on your "skin".

This technology has various possibilities not only to manage the heat of the entire car, but also to provide comfortable "scenes" in all everyday situations such as footbaths in winter and cold showers in the sea in midsummer and cold air in the golf cart in summer in the future etc.. You are welcome to stop by at our booth, please experience our concept, "Create THE FUTURE SCENES" !

Our Booth Picture



Hands-on exhibition of the effectiveness of thermal management by our ITMS
(You can feel 5°C cold water and 40°C warm water by your hands)



Visitors feeling the cold water generated by ITMS



Visitors feeling cold air generated by Spot cooler (Feel -15°C air)



■ Introduction of the products being displayed

ITMS: Integrated Thermal Management System

Since no exhaust heat from engine is available on electric vehicles, the drive battery consumption increases during heating and cooling, which leads to a decrease in cruising distance. This is a major challenge for electric vehicles to be solved.

Sanden is developing new technologies that will contribute to extending the cruising distance and improving passenger comfort by effectively utilizing the thermal energy of electric vehicles in an integrated manner.



ITMS3.0 Indirect
Integrated Thermal Management System

- Use indirect system uses water- mediated heat exchange technology to transfer heat from the refrigerant to water, and then from water to air
- This design protects refrigerant leakage to Passenger compartment, allowing the safe use of flammable refrigerant.



ITMS2.0 Direct
Integrated Thermal Management System

- The direct system achieves high heat exchange efficiency through direct interaction between refrigerant and air.
- Compatible with multiple refrigerants such as R1234yf and R744.

ECH : Electric Coolant Heater

Used as a new heat source of heating for electric vehicles in which no exhaust heat from engine is available.



Electric Coolant Heater

- High-voltage Compatibility and rapid heating performance.
- Designed specifically for 800V vehicle systems, this coolant heaters offers stable/ High-performance heating.
- With the adoption of the high- voltage system, ensuring rapid comfort passengers even on chilly mornings or in extreme cold climates

HVAC Unit : Heating, Ventilation & Air Conditioning Unit



HVAC
※Heating, Ventilation and Air Conditioning Unit

- HVAC stands for Heating, Ventilation & Air Conditioning Which is a system that controls Heating, ventilation, and air conditioning inside the Cabin of a Vehicle.

Electric Compressor

The electric compressors are used for the hybrid and electric vehicle application. The scroll type compression mechanism is used in order to ensure efficient compression. In addition, low noise impact and low environmental load are achieved by combining with a high-performance motor and inverter. They can also be used in an air conditioning systems for trucks during parking to ensure a comfortable cabin temperature without the engine running and consuming fuel.



Electric Compressor

800V EC

- Scroll mechanism Electric compressor for 800V applications (Battery Electric & Fuel Cell Vehicle).
- Compact, modular and scalable component design.
- Ready for thermal management application Including Heat Pump
- Key Component Modularity- even for different Refrigerant types.

R744EC

- Scroll mechanism optimized for R744 (CO₂) operation.
- Compact, modular and scalable component design.
- Ready for thermal management application including heat-pump.

Spot Cooler



Spot cooler

- Provide comfortable air conditioning to areas where this comfort has never been realized.
- Expected usage situation is forklift, small construction equipment, micro electric vehicle etc.

Please also have a look at the product's introduction panel with more detail information actually displayed in the venue from below.

Integrated Thermal Management System 3.0 Indirect

1

OVERVIEW

The indirect system uses water-mediated heat exchange technology to transfer heat from the refrigerant to water, and then from water to air. This design protects refrigerant leakage to passenger compartment, allowing the safe use of flammable refrigerants.

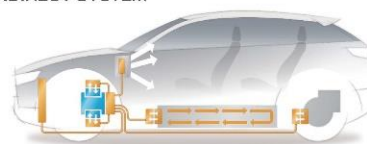
インダイレクトヒートポンプシステムは、冷媒から水、水から空気へと熱を移動させる、水を介した熱交換技術を利用
冷媒は、冷媒ユニットとよばれる部品内だけを循環しているため車室内へ冷媒が漏れにくいシステムであり、可燃性の懸念がある冷媒も安全に使用することが可能

FEATURES

- There are no refrigerant pipes in the passenger compartment, only water lines, allowing the safe use of flammable refrigerants like R290 (Propane) without concerns about leaks.
- The system achieves six control modes with a minimal number of valves, reducing component costs.
- The use of an integrated refrigerant unit achieves a simplified system configuration.
- 車室内には冷媒の配管がなく、水配管だけが通る構成のため R290(Propane) のような、可燃性の懸念がある冷媒の車室内への漏れを気にせず使用可能
- 6 つの制御モードを最小限のバルブ数で実現し、部品コストを抑える
- 複数のコンポーネントを一体化した冷媒ユニットにより、シンプルなシステム構成を実現

KEY TECHNOLOGY

INDIRECT SYSTEM



Cabin cooling 車室内冷却	Coolant クーラント
Cabin heating 車室内暖房	Coolant クーラント
Heat exchange with outside air 外気との熱交換	Coolant クーラント
Waste heat recovery 排熱回収	Battery warming / Cabin heating バッテリー加熱 / 車室内暖房
Battery cooling バッテリー冷却	Coolant クーラント
Battery warming バッテリー加熱	Coolant クーラント

— Refrigerating circuit
— Coolant (water) circuit

SPECIFICATIONS

Working fluid 作動流体	R290 (Propane)
Heating performance 暖房能力	8kW
Cooling performance 冷房能力	8kW
Temperature range 使用外気温度範囲	-40°C ~ 50°C
Communication 通信	LIN / CAN

Integrated Thermal Management System 2.0 Direct

2

OVERVIEW

The direct system achieves high heat exchange efficiency through direct interaction between refrigerant and air, resulting more efficient system. Compatible with multiple refrigerants such as R1234yf and R744.

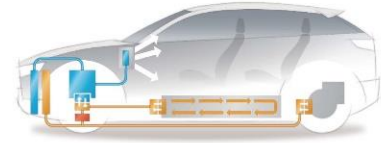
ダイレクトヒートポンプシステムは冷媒から空気に直接熱を伝搬させる熱交換方法を使用している、熱交換効率が高いシステム R1234yf、R744 といった複数の冷媒に対応

FEATURES

- An integrated module combining valves and piping achieves a simplified piping configuration, making maintenance easier.
- Energy savings are realized through dehumidification operations without PTC heaters.
- The heat pump independently can provide heating even in extreme low-temperature environments down to -40°C (-40°F).
- バルブや主要な配管を一体化したモジュールにより、シンプルな配管構成が可能となりメンテナンスも容易
- PTC ヒーターを使わずヒートポンプだけで除湿運転ができる、省電力なシステム
- 40°C (-40°F) の低温外気環境でも、ヒートポンプの自己加熱で暖房を行うことが可能

KEY TECHNOLOGY

DIRECT SYSTEM



Cabin cooling 車室内冷却	Refrigerant 冷媒
Cabin heating 車室内暖房	Refrigerant 冷媒
Heat exchange with outside air 外気との熱交換	Refrigerant 冷媒
Waste heat recovery 排熱回収	Cabin heating 車室内暖房
Battery cooling バッテリー冷却	Coolant クーラント
Battery warming バッテリー加熱	Heating by ECH ECHで加熱

— Refrigerating circuit
— Coolant (water) circuit

SPECIFICATIONS

Working fluid 作動流体	HFC134a HFO1234yf / R744 (CO2)
Heating performance 暖房能力	8kW
Cooling performance 冷房能力	8kW
Temperature range 使用外気温度範囲	-40°C ~ 50°C
Communication 通信	LIN / CAN



HVAC Unit

OVERVIEW

HVAC stands for Heating, Ventilation & Air Conditioning, which is a system that controls heating, ventilation, and air conditioning inside the cabin of a vehicle.

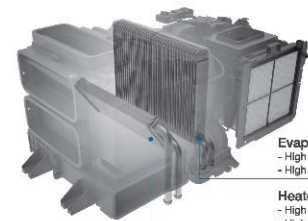
This HVAC is designed for construction machinery.

HVAC とは、Heating, Ventilation & Air Conditioning の略で、車室内の暖房、通風、および空調を制御するシステム
本 HVAC は建設機械用に設計

FEATURES

- Compact, efficient & durable HVAC dedicated for the Construction Machinery.
- Heater core & Evaporator: High corrosion protection.
- Nominated for many applications and highly reliable.
- Integrated molding allows number of component reduction.
- Complies with Tier 4 exhaust gas regulations.
- 建設機械専用で高効率かつ高い耐久性
- ヒーターコア&エバポレーター：高い耐食性
- 採用実績が多く、高い信頼性
- 一体成型による部品点数削減
- 4次排ガス規制 (Tier4) に対応

KEY TECHNOLOGY



Evaporator
- High performance
- High corrosion protection

Heater core
- High performance
- High corrosion protection

SPECIFICATIONS

Working fluid 作動流体	HFC-134a
Size 大きさ	684mm x 331mm x 403mm
Weight 重さ	9.7kg
Air distribution modes 吹き出しモード	Face, Vent, Bi-level, Foot, Foot / Def, Defrost
Temperature control 温度コントロール	Full air mixing
Max. air flow 最大風量	630m ³ / h
Heating capacity 暖房能力	6.0kw at 350m ³ / h
Cooling capacity 冷房能力	5.2kw at 630m ³ / h
Rated Voltage 定格電圧	24V



3

800V Electric Coolant Heater

4

OVERVIEW

High-voltage Compatibility and Rapid Heating Performance. Designed specifically for 800V electric vehicle systems, this coolant heater offers stable and high-performance heating. With the adoption of the high-voltage system, ensuring rapid comfort for passengers even on chilly mornings or in extreme cold climates.

当製品は 800V 電気車両システムに特化して設計され、一貫して高い暖房性能を実現。高電圧システムの特長を活かし、短時間での効果的な暖房が可能。寒冷地や冷え込んだ朝のドライブも、乗員に快適な時間を保証。

FEATURES

Efficiency

- Direct heating of coolant achieves over 90% efficiency at 3.0kW & 6.0kW.
- Higher efficiency at 10kW.

Quick output

- Flexible design and robust durability of our cartridge heater, allows reach 6kW output within 500ms (input 350V or more).

Stable output

- Our product can operate under diverse conditions and offers stable performance at any coolant temperature.

高効率

- ヒーターで直接冷却液を温めることで、3.0kW と 6.0kW で 90% 以上の熱効率
- 10kW では更に高い効率を実現

瞬間加熱

- カートリッジヒーターの柔軟な構成と強い耐久性により、入力が 350V 以上の際に、わずか 500ms 以内で 6kW の出力に到達することが可能

安定した出力

- 冷却液の温度範囲に関わらず、当製品は一貫して安定した性能を発揮し、さまざまな条件下でも最適な動作が実現



KEY TECHNOLOGY

Sanden cartridge heater with proprietary tech delivers high output despite its size. Designed to redefine industry standards, it's versatile for many applications.

独自の技術を持つカートリッジヒーターを研究・開発。小さいながらも高出力。業界の新基準を目指し、多岐にわたる用途に対応。



Cartridge heater
カートリッジヒーター

SPECIFICATIONS

Size 大きさ	W200mm x D216mm x H67mm
Weight 重さ	2.5kg
Max power マックスパワー	10kW@500V or more
High voltage 性能保証電圧範囲	250 - 900V
Low voltage 制御電圧範囲	9 - 16V
Heater type ヒータータイプ	Cartridge
Communication 通信	CAN / LIN
IP level IP レベル	IP67, IP6K9K
Coolant pressure loss 水圧損失	2.5kPa@10L / min

800V Electric Compressor

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OVERVIEW

Scroll mechanism Electric compressor for 800V applications (Battery Electric & Fuel Cell Electric Vehicle).

- Compact, modular and scalable component design.
- Ready for thermal management application incl. heat-pump.

スクロール圧縮 800V アプリケーション用電動コンプレッサ (バッテリー電気自動車および燃料電池電気自動車へ搭載)
- コンパクトでモジュール化された拡張性の高いデザイン
- ヒートポンプ運転を含めたサーマルマネジメントへの適合

FEATURES

High Efficiency

- Innovative variable back pressure and oil management.
- 800V SiC inverter technology.

Enhanced Reliability

- Reinforced scroll materials and coatings.
- Extended bearing lifespan.

Excellent NVH

- Reduced Discharge Pulsation.
- Vibration decoupling elements available.

高効率化

- 革新的な可変背圧技術とオイルマネージメント
- 800V SiC インバーター技術を搭載

信頼性の向上

- スクロール素材と表面処理技術の強化
- 高寿命ベアリングの採用

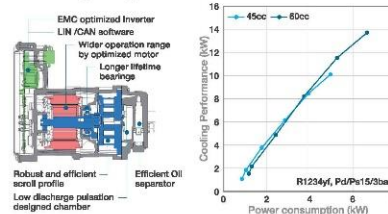
低騒音化

- 吐出脈動の低減
- 振動抑制素材の適用



KEY TECHNOLOGY

Cut-Away Image & Performance Data

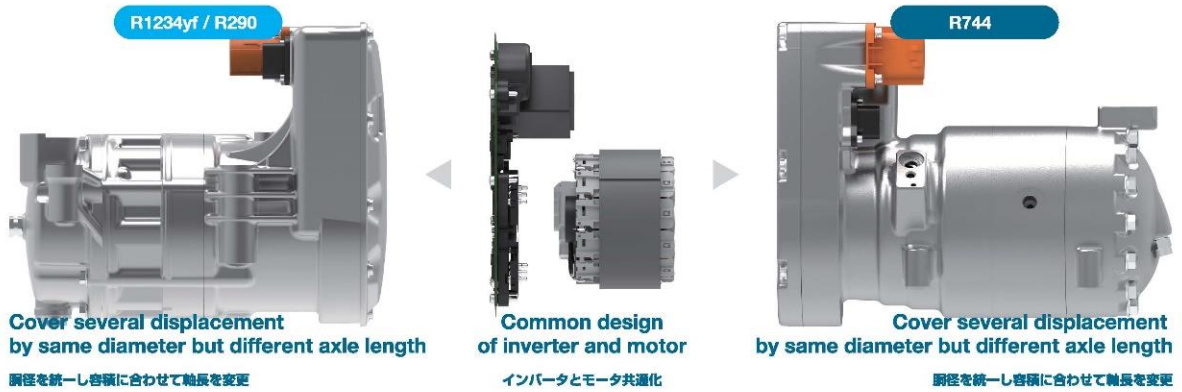


SPECIFICATIONS

Refrigerant 冷媒	HFC134a HFO1234yf / (R290)
Outer Dimension 外形寸法	φ132 mm x 250 mm (45cc)
Weight 重量	7.5 kg (46 cc)
Speed range 速度範囲	800-9,000 rpm
Displacement 容積	45 cc & 60 cc
Voltage range 電圧範囲	320-876 V
Oil オイル	PAG / POE
Temperature range 温度範囲	-40°C ~ 85°C
Communication 通信	LIN / CAN
Waterproof & Dustproof 防水 & 防塵	IP6K6, IP6K9K

Key Component Modularity – even for different Refrigerant Types ▶ Quality / Productivity / Cost improvement

主要コンポーネントをモジュール化することで、異なる冷媒タイプでも対応可能 ▶ 品質の安定性向上 / 生産効率 UP / 原価改善を実現



	800V 60cc	800V 9.5cc	800V 45cc	800V 7.5cc	500V 45cc	500V 5.5cc	500V 34cc
Inverter	Mono-Piece PCB SiC				Mono-Piece PCB IGBT		
Motor	φ103 × 50mm		φ103 × 37mm		φ103 × 37mm		φ103 × 32mm
Scroll	φ91 × 28mm AL-Scroll	φ71 × 11.6mm FE-Scroll	φ91 × 21mm AL-Scroll	φ71 × 9.2mm FE-Scroll	φ91 × 21mm AL-Scroll	φ71 × 6.7mm FE-Scroll	φ91 × 16mm AL-Scroll
Casing	3-piece HP-DC	3-piece VLF	3-piece HP-DC	3-piece VLF	3-piece HP-DC	3-piece VLF	3-piece HP-DC



R744 Electric Compressor

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OVERVIEW

- Scroll mechanism optimized for R744 (CO₂) operation.
- Compact, modular and scalable component design.
- Ready for thermal management application incl. heat-pump.

- R744 (CO₂) の運用に最適化されたスクロール機構
- コンパクトでモジュール化された拡張性の高いデザイン
- ヒートポンプ運転を含めたサーマルマネージメントへの適合

FEATURES

High Efficiency

- Innovative variable back pressure and oil management.
- 800V SiC inverter technology.

Enhanced Reliability

- Reinforced scroll materials and coatings.
- Extended bearing lifespan design.

Excellent NVH

- Integrated discharge pressure pulsation muffler.
- Vibration decoupling elements available.

高効率化

- 革新的な可変背圧技術とオイルマネージメント
- 800V SiC インバータ技術を搭載

信頼性の向上

- スクロール素材と表面処理技術の強化
- 高寿命ベアリングの採用

低騒音化

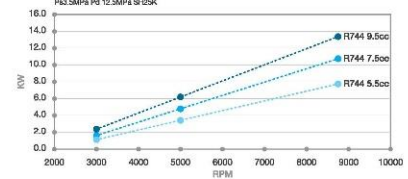
- 吐出圧脈動マフラーを一体化
- 振動抑制素材の適用



KEY TECHNOLOGY



R744 Cooling performance vs Speed
Pd: 2.5MPa / Pd: 12.5MPa @ 25K



SPECIFICATIONS

Refrigerant 冷媒	R744 (CO ₂)
Speed range 速度範囲	8600rpm
Voltage range 電圧範囲	400V / 800V
Displacement 容積	5.5cc / 7.5cc / 9.5cc
Communication 通信	LIN / CAN
Weight 重量	< 9kg

Spot Cooler

OVERVIEW

Provide comfortable air conditioning to areas where this comfort has never been realized. Expected usage situation is forklift, small construction equipment, micro electric vehicle etc.

「これまで空調という発想が無かったシーンに 快適な空調を提供できる製品」として、超小型電気自動車、待機中のトラック・バスの運転席、小型農建機、ゴルフカートなどのモビリティ、あらゆる作業場、アウトドアなどでも活躍できる業界トップクラスの小型高性能スポットクーラー

FEATURES

High performance & Compact design

- Top cooling performance (performance / size). (Air temperature can reach to 23°C when ambient temperature is 35°C)
- Length and Width same as A4 paper size, Weight 6kg.

Highly resistant to vibration

- Robust product for outside usage supported by Sanden mobility know-how, also available in dusty or rainy condition. (for the mobility, open air space, etc.)

高性能でコンパクトなデザイン

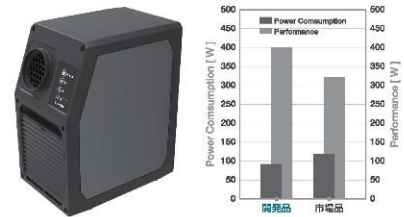
- 性能容積比で業界トップクラスの性能（外気温が35度の時に吹き出し温度23度）
- 床面積はA4サイズで6kgで持ち運び可能

振動に強い

- サンデンの車載部品技術を活かした振動耐久性があり、雨風が想定されるアウトドアでも使用可能

KEY TECHNOLOGY

Performance test result of the prototype unit



SPECIFICATIONS

Refrigerant 冷媒	HFC134a / (HFO1234yf)
Performance 冷房能力	400W @ 60 m³/h
Air flow 風量	40,60,80 m³/h
Size サイズ	275 mm x 185 mm x 333 mm
Weight 重量	6.0 kg
Ambient temperature range 使用環境温度	15 ~ 45°C
Temperature range 消費電力	Max 120 W
Input voltage range 入力電圧範囲	12V : DC12-16V (AC 100V)



<Date and time>

From October 28 (Sat) to November 5 (Sun)【The date Open to the public】
9am~7pm (Mon~Sat/Holiday), 9am~6pm(Sun)

<Place> Tokyo Big Sight, West 3 Hall, 4th Floor (Booth No. W4101)
(3 minutes' walk from Tokyo Big Sight Station on Yurikamome Line)

- At our booth, we will be distributing novelties (body warmers, stickers, and business-card-sized cards with information link on our exhibiting products), which were realized through collaboration between Gunma-chan, the mascot character of Gunma Prefecture, and our company which is a company in Gunma Prefecture. (Will finish distribution as soon as it runs out) Please come and enjoy these novelties as well.



For Inquiry about this
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