

Clean Energy Clean Future

KUS



Clean Energy Clean Future



KUS America Web

✉ info@kus-usa.com

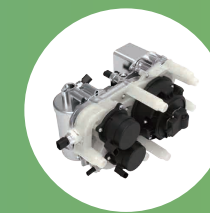
🌐 www.kus-usa.com



Battery Thermal Management System



PTC Water Heater Unit



Thermal Management Integrated Module



KUS, founded in 2004, is a global automotive parts and assembly supplier integrating R&D, production, sales and service.

KUS relies on its layout and competitive advantages in sensors and thermal management to develop new energy products such as PTC heater, cold plate, battery thermal management system, thermal management integration module, thermal management unit, multi-way valve, pipeline, energy storage cabinet, battery pack, high/low voltage wiring harness. KUS products are widely used in many industries and fields such commercial vehicles, passenger vehicles, off-road machinery and energy storage. It can provide professional products and high-quality services for customers with hydrogen fuel systems, pure electric vehicles, and hybrid vehicles.



KUS America



KUS Mexico



KUS Europe



KUS India



KUS Thailand



KUS Weifang



KUS Hefei



KUS Shenzhen



KUS Automation



KUS

Maximize Customers' Value Continuously

Card Slot

PTC Water Heater Unit

PTC Water Heater Unit is used in electric, hybrid, and fuel cell vehicles. These PTC Heaters help to provide heat sources for in-vehicle air conditioning systems and battery thermal management. PTC Heaters increase electrical resistance at temperatures above a set value, which enable them to maintain a constant heating temperature during load and supply voltage changes, while maintaining a high safety factor. The overall structure is composed of radiators (including PTC heating packs), coolant flow channels, a main control board, high/low pressure connector, and an upper shell. It ensures stable heating power, high heating efficiency, and constant temperature control for various applications and designs.



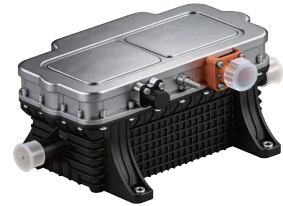
350V 5kW



600V/800V 7kW



600V/800V 10kW-15kW



600V/800V 24kW

Model	NPL20	NPH30/NPH30A	NPK40	NPH50	NWH70A/ NWK70A
Specification	350V-5kW	600V-7kW	600V/800V-10kW	600V/800V-15kW	600V/800V-24kW
Power	5kW±10%	7kW±10%	10kW±10%	15kW±10%	24kW±10%
Rated Conditions	Coolant=60°C, 10L/min	Coolant=0°C, 10L/min	Coolant=60°C, 12L/min	Coolant=0°C, 25L/min	Coolant=20°C, 40L/min
Application Scenarios	Passenger Car\ Gas Power System	Commercial Vehicle\ Passenger Car\ Gas Power System	Commercial Vehicle\ Construction Machinery\ Gas Power System	Commercial Vehicle\ Construction Machinery\ Gas Power System	Commercial Vehicle\ Construction Machinery\ Gas Power System
Ambient Temperature	-40°C-85°C	-40°C-85°C	-40°C-85°C	-40°C-85°C	-40°C-85°C
Storage Temperature	-40°C-105°C	-40°C-105°C	-40°C-105°C	-40°C-105°C	-40°C-105°C
Cooling Water Temperature	-40°C-90°C	-40°C-90°C	-40°C-90°C	-40°C-90°C	-40°C-90°C
Low Voltage	9V-36V, Un=12/24V	9V-36V, Un=12/24V	9V-36V, Un=12/24V	9V-36V, Un=12/24V	9V-36V, Un=12/24V
Low Voltage Current	≤150mA	≤150mA	≤160mA	≤150mA	≤150mA
High Voltage	250V-450V, Un=350V	450V-750V, Un=600V	750V-875V, Un=800V	400V-750V, Un=600V	450V-950V, Un=800V
High Voltage Current	≤30A	≤30A	≤40A	≤60A	≤60A
Insulation Resistance	≥100MΩ	≥100MΩ	≥200MΩ	≥200MΩ	≥200MΩ

PTC Air Heater

PTC air heater is a positive temperature coefficient heater which consists of specialized heating discs built from advanced ceramic materials. In fuel cell, electric, and hybrid vehicle air conditioning systems, the PTC air heater replaces a traditional fuel vehicle heater core and is installed in the HVAC assembly. The air heater is powered and controlled by the vehicle. The function of the air heater is to blow warm air through the air ducts to heat the cabin and defrost or defog windows.



High Pressure Split Air Heater

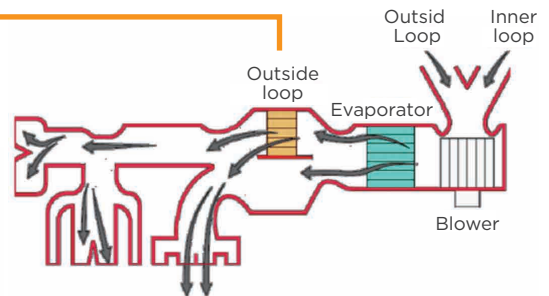
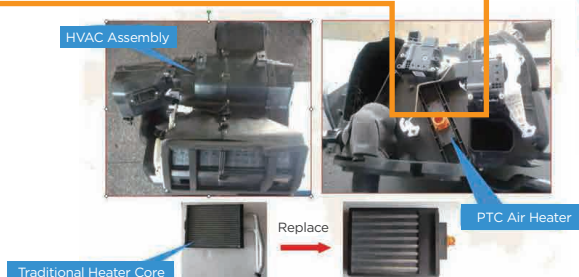


High Pressure Integrated Wind Heater

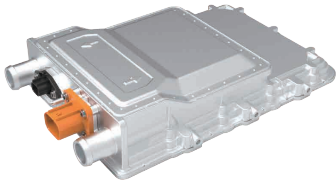
Technical Performance	Performance Parameters		
	High Pressure Integrated Wind Heater	High Pressure Split Air Heater	Heat Pump Air Conditioning Auxiliary Low Pressure Heater
Rated Voltage	350VDC/600VDC/800VDC (Can be customized according to customer requirements)	350VDC/600VDC/800VDC (Can be customized according to customer requirements)	12V/24V
Power	5.0KW±10% (Can be customized according to customer requirements)	5.0KW±10% (Inlet air temperature 25°C, wind speed 4.5m/s (Can be customized according to customer requirements)	1.5KW±10% (Inlet air temperature 25°C, wind speed 4.5m/s)
Control Method	PWM, PID control	PWM, I/O (without controller, controlled by the vehicle)	I/O binning control
Communication Method	CAN, LIN optional	/	/
Insulation Pressure Resistance	3500VDC (or 2200VAC) continue 1min, leakage current <5mA	3500VDC (or 2200VAC) continue 1min, leakage current <5mA	/
Resistance of Insulation	Voltage 1000VDC, continue 1min, impedance >500MΩ	Voltage 1000VDC, continue 1min, impedance >500MΩ	/
Ceramic Chip Withstand Voltage	>1000V	>1000V	>300V
Peak Current	≤40A	≤40A	/
Storage Temperature	-40°C~120°C	-40°C~120°C	-40°C~120°C
Automatic Shutdown Protection Temperature	187°C (Can be customized according to customer system matching)	187°C (Can be customized according to customer system matching)	184°C (Can be customized according to customer system matching)
Protective	IP6K7	IP6K7	IP54
Security	Built-in temperature acquisition, over temperature, over current, over voltage protection	Built-in temperature acquisition and overheating protection	Built-in temperature acquisition and overheating protection



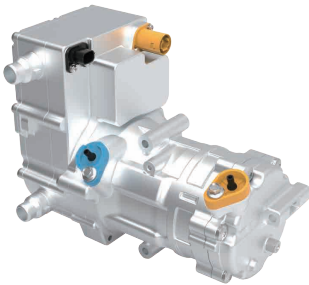
HVAC Assembly



Thick Film Heater



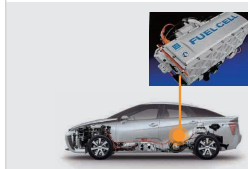
Thick Film Heater



Integrated Compressor and Thick Film Heater

Application Scenario

Thick film heaters is primarily used in the air conditioning systems and battery thermal management systems of battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and hydrogen fuel cell vehicles.



Hydrogen fuel cell vehicle



Electric vehicle



Hybrid electric vehicle

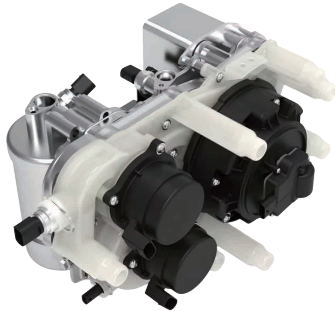
Product Functions

1. Thick film heating is a heating method based on thick film circuit technology. It offers stable resistance values, precise temperature control, fast heating response, and high thermal efficiency. Characterized by rapid temperature rise, its compact structure facilitates easy installation and integration.
2. The integration of heaters and compressors is a critical combination in industrial heating systems. We offer a variety of heater solutions to meet different integration requirements.

Item	Thick Film Heater	Integrated Compressor and Thick Film Heater
Environmental Temperature	-40-120°C	-40-120°C
Storage Temperature	-40-120°C	-40-120°C
Cooling Water Temperature	-40-90°C	-40-90°C
Power	10KW ±10%	8kW ±10%
Insulation Resistance	≥ 200 MΩ @ 1000VDC	≥ 50MΩ @ 1000VDC
Insulation Withstand Voltage	2800VAC/1min or 3900VDC/1min	2800VAC/50Hz/1min or 3900VDC/1min
Low Voltage Current	40mA-150mA, I=70mA	/
High-voltage Current	12.8A-15.7A, I=14.28A	/
Low Voltage	9-36V, U=12/24V	/
High Voltage	450V-850V, U=700V	/
Low-voltage Standby Current	1mA	/
Rated High Pressure	700V	600V
Rated Low Voltage	24V	24V



Thermal Management Integrated Module



The thermal management integrated module integrates battery temperature control, passenger cabin air conditioning control, and electric drive system cooling to achieve efficient thermal energy distribution and waste heat recovery. The module consists of core components such as plate heat exchangers, electronic expansion valves, multi-way valves, electronic water pumps, and sensors. This design precisely regulates the operating temperatures of various systems, extends battery life, significantly reduces air conditioning energy consumption, and improves winter driving range, while simultaneously ensuring passenger comfort and overall vehicle energy efficiency.

Product Features

1. Thermal management of battery systems
2. Thermal management of the crew cabin (air conditioning) system
3. Thermal management of motor electronic control system
4. Vehicle heat scheduling and rational utilization of waste heat

Product Characteristics

1. Products are highly integrated
2. High strength, high reliability
3. Can effectively control the direction and flow of fluid
4. Achieve efficient heat exchange between refrigerant and coolant

Item	Fully Integrated Module	Coolant Side Module
Water Flow Rate	Rated 20L/min	Rated 50L/min
Ambient Temperature	-30-85°C	-30-85°C
Storage Temperature	-40-90°C	-40-90°C
Coolant Temperature	-30-80°C	-30-80°C
Low Voltage	12VDC	24VDC
Integrated Components	Water pump*2 7-way valve *1 SOV*3 EXV*1 LCC*1 Chiller*1 separator*1	Water pump *2 5-way valve*1 Sensor*3

Automotive Battery Management System

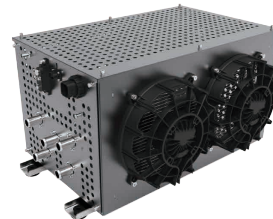
Automotive Battery Management System is one of the important components of the thermal management system of new energy vehicles. It is used to meet the continuous cooling needs of the battery pack, so that the lithium battery pack can work in a suitable temperature range, extend the battery life, and improve the battery safety. It is mainly composed of a compressor, ECU, PTC heater (optional), fan, water pump, condenser plate heat exchanger, expansion valve, pipeline, etc. Products with different dimensions and cooling/heating power range of 3kW-50kW can be customized according to customer needs.



3kW



5kW



7kW



9kW

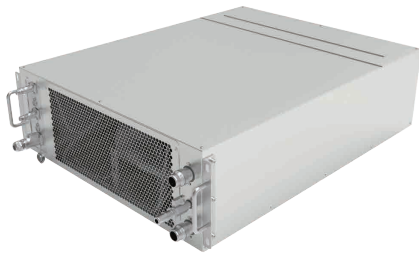


11kW

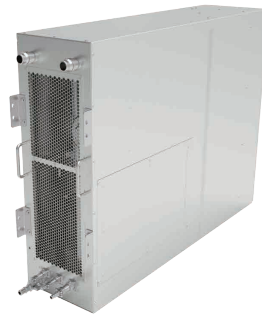
Power	3kW	5kW	7kW	9kW	11kW
Operating Temperature (°C)	-30~+55°C	-30~+55°C	-30~+55°C	-30~+55°C	-30~+55°C
Dimensions (mm)	536*582*407	598*530*431	834*574*287	834*574*287	1034*600*316
Rated Cooling Capacity (kW)	≥3kW @ (inlet water 20°C&15L/min, ambient temperature 40°C)	≥5kW @ (inlet water 20°C&30L/min, ambient temperature 40°C)	≥7kW @ (inlet water 20°C&30L/min, ambient temperature 40°C)	≥9kW @ (inlet water 20°C&30L/min, ambient temperature 40°C)	≥11kW @ (water inlet 20°C&50L/min, ambient temperature 40°C)
Rated Heating Capacity (kW)	≥3kW @ (inlet water -20°C&15L/min)	≥7kW @ (inlet water -20°C&30L/min)	≥7kW @ (inlet water -20°C&30L/min)	7kW @ (inlet water -20°C&30L/min)	≥15kW @ (inlet water -20°C&50L/min)
Noise Level dB(A)	≤75@40°C	≤80@40°C	≤83@40°C	≤85@40°C	≤87@40°C
IP	IP55 (IP67 for high-voltage parts)	IP55 (IP67 for high-voltage parts)	IP55 (IP67 for high-voltage parts)	IP55 (IP67 for high-voltage parts)	IP55 (IP67 for high-voltage parts)
High Voltage Range (V)	DC450-750V	DC450-750V	DC450-750V	DC450-750V	DC450-750V
Low Voltage Range(V)	DC18V-32V	DC18-32V	DC18-32V	DC18-32V	DC18-32V
Communication	CAN2.0	CAN2.0	CAN2.0	CAN2.0	CAN2.0
Refrigerant	R134a	R134a	R134a	R134a	R134a
Refrigeration System Tightness	Refrigerant leakage <20g/year	Refrigerant leakage <20g/year	Refrigerant leakage <20g/year	Refrigerant leakage <20g/year	Refrigerant leakage <20g/year
Pipe Type	Quick Connectors	Rubber tube + clamp	Rubber tube + clamp	Rubber tube + clamp	Rubber tube + clamp
Pump Head	15LPM@90KPa	30LPM@190KPa	30LPM@190KPa	30LPM@190KPa	50LPM@170KPa

Energy Storage Battery Management System

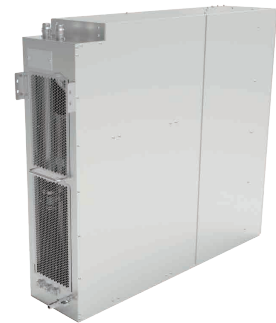
Energy Storage Battery Management System is mainly used in outdoor energy storage, industrial and commercial energy storage, container energy storage and other scenarios to meet the continuous cooling and heating needs of the battery pack, so that the lithium battery pack can work in a suitable temperature range, extend the battery life and improve battery safety. Energy Storage Thermal Management System is mainly composed of a compressor, ECU, PTC heater, fan, water pump, condenser, plate heat exchanger, expansion valve, pipeline, etc. KUS's current main product series include vertical 5kW, 8kW, and horizontal 5kW.



Horizontal 5kW



Vertical 5kW

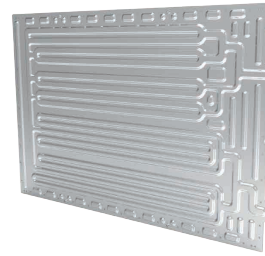


Vertical 8kW

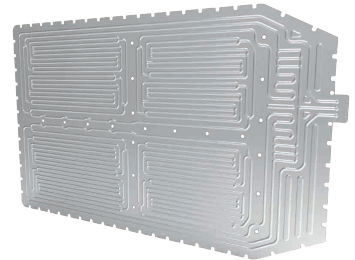
Power	Horizontal 5kW	Vertical 5kW	Vertical 8kW
Application Areas	Industrial and commercial energy storage cabinet	Industrial and commercial energy storage cabinet	Industrial and commercial energy storage cabinet
Installation	Embedded horizontal type	Frame type (vertical)	Frame type (vertical)
Working Environment Range	-30°C~+55°C	-30°C~+55°C	-30°C~+55°C
Overall Dimensions (W*D*H, mm)	700*900*245	275*1050*800	275*1150*1040
Rated Cooling Capacity (kW)	5@W18/L35	5@W18/L45	8@W18/L45
Electric Heating Capacity (kW)	2	2	2
Noise Level dB(A)	72	≤ 73	≤ 75
IP	IP55	IP55	IP55
Corrosion Resistance Grade	C3	C3	C3
Equipment Life (years)	10	10	10
Power Supply Range (V, Hz)	220V±15%, 50/60±3	220V±15%, 50/60±3	220V±15%, 50/60±3
Communication	RS485	RS485	RS485
Refrigerant	R134a	R134a	R134a
Refrigeration System Tightness	Refrigerant leakage <10g/year	Refrigerant leakage <10g/year	Refrigerant leakage <10g/year
Coolant	50% Ethylene glycol	50% Ethylene glycol	50% Ethylene glycol
Water Flow Rate (L/min)	45LPM@100KPa	45LPM@100KPa	50LPM@100KPa

Cooling Plate

Cooling Plates are mainly used in battery packs of new energy vehicles and energy storage systems. They exchange heat with power/energy storage batteries through internal circulating liquid, keeping them in a suitable operating temperature range at all times, thereby improving battery life and working efficiency.



Energy Storage
Liquid Cooling Plate



Power Battery
Liquid Cooling Plate

Main Application Field



Power Battery



Lithium Battery
Storage Cabinet



5G Communication



Liquid Cooled Server

Material Characteristics

1.4045/3003, 4045/3003MOD composite plate stamping forming

2. Common material thickness 0.8, 1.0, 1.2mm, alloy/state: 3003-O state, 3003MOD-O state

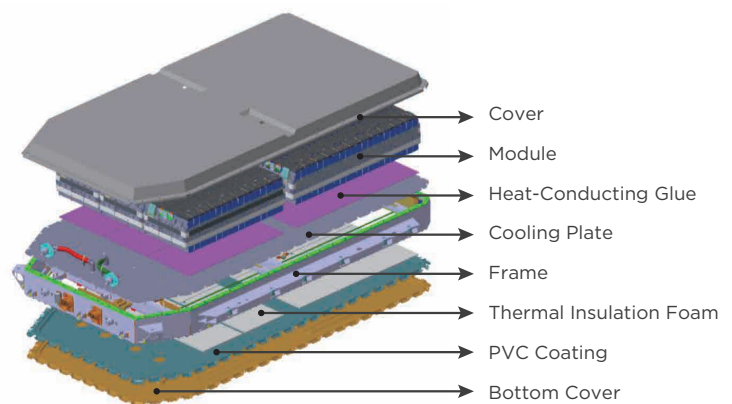
3. Tensile strength: 95-135MPa (3003), ≥ 145 MPa (3003MOD)

4. Yield strength: ≥ 35 MPa (3003), ≥ 50 MPa (3003MOD)

5. Material elongation $\geq 25\%$ (3003), $\geq 20\%$ (3003MOD)

Product Superiority

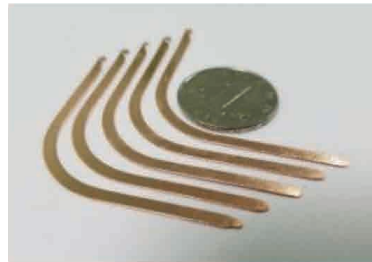
1. Uniform temperature design to improve the battery life.
2. Provides liquid cooling for direct cooling system solutions.
3. Low flow resistance design, reduces the energy consumption of the liquid cooling system.
4. Uniform temperatures and current ensures the temperature stability of battery powered modules under various conditions.
5. Large footprint reduces the amount of additional connection ports needed and lowers the risk of leakage in the system.
6. High strength and corrosion resistant materials improve product life, and reduce the wall thickness and weight of products.



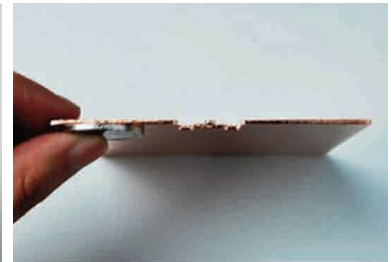
Cooling Plate achieve thermal control by transferring heat from the battery or other heating sources to the cooling medium.

Vapor Chamber

The function and working principle of the vapor chamber are the same as those of the heat pipe. The fluid enclosed in the plate-shaped cavity undergoes conduction, evaporation, convection, solidification, and reflux to complete the heat transfer cycle, achieving the functions of rapid temperature uniformity, rapid heat conduction, and heat diffusion.

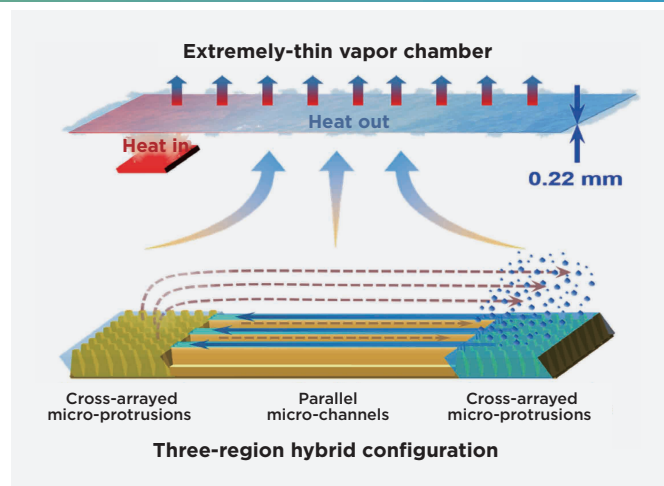
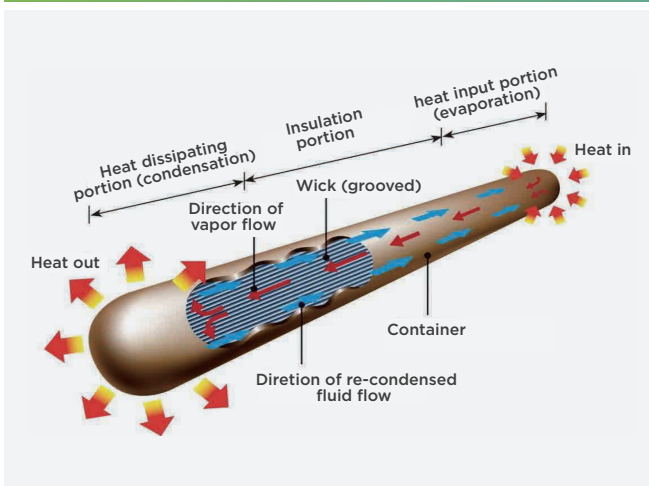


Flattened ultra-thin heat pipe

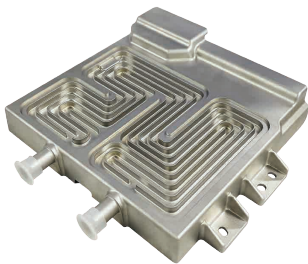


Ultra-thin vapor chamber

Working Principle



Domain Control Cooling Plate



Vehicle domain controller will generate excess heat during operation, and as the function integration becomes higher and higher, the power consumption and heat generation will gradually increase, so effective active cooling is required. The domain control Cooler can be used for the cooling of the vehicle domain controller, and the cooling medium is provided through the liquid cooling circuit inside the vehicle to absorb the heat of the vehicle domain controller to ensure the reliable and efficient operation of the system.

Energy Storage Cabinet



**261kWh
Energy Storage Cabinet**



**418kWh
Energy Storage Cabinet**

Product Characteristics

1. Peak-valley arbitrage: Charging at low electricity prices and discharging at high prices to directly reduce electricity costs.
2. Emergency support: As a backup power source during grid failures, ensuring the continuity of production.
3. Integrated photovoltaic, energy storage and charging: Combining photovoltaic, energy storage and charging stations to achieve energy optimization.
4. Demand-side management: Smoothing the charging load curve to reduce the impact on the grid.
5. Relieving grid pressure: Discharging during peak charging times to avoid transformer overload.
6. Improving efficiency: Implementing intelligent energy scheduling and peak shaving and valley filling within the station.
7. Green shore power: Providing clean electricity for ships berthed at ports, replacing high-pollution auxiliary engines with power generation.
8. Energy supply: In areas not covered by the grid, forming an independent power supply system in combination with renewable energy.
9. Precise irrigation: Combined with intelligent irrigation systems, achieving water conservation and emission reduction.
10. Energy synergy: Integrating various clean energy sources to achieve optimized energy configuration and near-zero carbon emissions in the park.

Battery Pack



Energy storage battery packs are energy "power banks" and are widely used in grid peak shaving, new energy power plants, and energy storage in homes and industrial and commercial settings to meet the balance of power supply and demand.

The power battery pack is the "heart" of new energy vehicles. It not only provides driving energy for the vehicle, but also undertakes multiple important functions such as battery management, protection and thermal control to ensure the safe, reliable and efficient operation of the power battery system.

Motor & Battery Pack Coolant Water Pipe

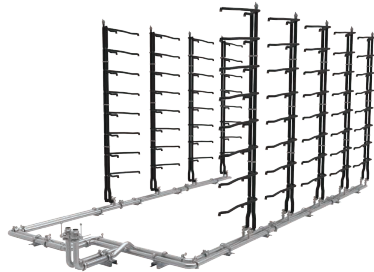


Motor Battery Pack Cooling Water Pipe

Motor battery coolant pipe is used for the thermal management system of fuel vehicle or electric vehicle. It carries the channel for conveying automotive coolant, and provides temperature rise or drop for the engine through the flow of coolant on the pipe, so that the battery pack can quickly warm up in cold environment. Meanwhile, it also takes away waste heat and provides ventilation function of the cooling system.

Lightweight	Compared with the hose solution, it can achieve a weight reduction of about 60%.
Efficient Production	Multi-layer co-extrusion, thermoplastic molding, quick plug connection, fast disassembly and assembly excellent.
Excellent Performance	Mechanical, chemical and hydrolysis resistance, extremely low water permeability.
Safe and Stable	Reliable and traceable connection process, mature and extensive market application performance.

Energy Storage System Cooling Water Pipe



The energy storage system cooling water pipe provides a liquid cooling channel for the energy storage system (industrial and commercial energy storage, data center, etc.), transports the cooling liquid through the cooling water pipe and quickly transfers heat to the battery pack and data center server to balance system performance.

Fuel Pipe



Fuel pipe are used in the automotive fuel system to transfer fuel from the tank to the engine to provide power to the vehicle; Products have good extreme temperature resistance, aging resistance, corrosion resistance, fuel penetration resistance and so on.

Air Conditioning Aluminum Pipe



It is mainly used in the environmental control of the passenger cabin, the thermal management of the battery pack, and the cooling of the motor and electronic control systems, meeting the requirements of refrigeration, heating, and heat exchange. They possess excellent high-pressure bearing capacity, outstanding barrier performance, and remarkable high-temperature resistance and thermal stability properties.

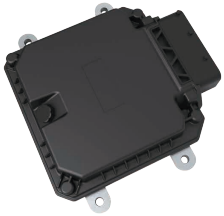
Pipe Connector



Pipe Connectors are parts used to connect pipelines. They have the characteristics of convenient installation, superior performance, and long service life. They can be widely used in automotive fuel systems, SCR systems, power systems, cooling systems, and air-conditioning systems.

Thermal Management System & Cell Voltage Monitor

TMS (Thermal Management System) has functions such as air conditioning management, heat pump management, battery thermal management, waste heat recovery management, fault diagnosis, predictive thermal management, sensor acquisition, network communication, etc., which can cover the mainstream topology and control/drive requirements in the market. Through precise control and comprehensive optimization matching of each circuit, it can bring energy efficiency optimization and experience improvement to customers, and is widely used in new energy vehicles and energy storage industries.



TMS Features

1. Resource interface type configuration is flexible. The PWM output interface has output configuration control and fault feedback functions. Through the interface, it can meet different usage requirements.
2. It has network security functions and meets the network information security requirements of the OEM.
3. Real-time monitoring of sensor status; real-time diagnosis of system faults and other functions.
4. Flexible and convenient bottom software and application layer integration method.

TMS-NDM10

Power Supply	12V/24V	Output Interface	PWM output, high-side drive, low-side drive
Static Power Consumption	≤1mA	Number Of Voltage Measurement Channels	/
Functional Safety Level	ASIL B	Voltage Range	/
Protection Level	IP67	Number Of Impedance Measurement Channels	/
Flash	2M	Impedance Range	/
Soft Bottom	UDS, Bootloader, NM, information security	Phase	/
Communication Type	CAN, LIN	Impedance Frequency	/
Input Interface	Digital/analog input, PWM input	Other	Hardwire wake-up

High Voltage Wiring Harness Assembly



Product Characteristics

- Current up to 750A @25°C
- Voltage class up to 1000V
- Wire adaptation range 2.5mm² - 150mm²
- Meet 360°EMI
- IP67 (assembled) - IP2X (unassembled)

Low Voltage Wiring Harness Assembly



Product Characteristics

- Up to 200+ loops
- Waterproof IP67 IP69X
- oil-proof
- Engine, gearbox piercing parts
- Vibration resistance



Pressure Sensor



The pressure sensor mainly measures the pressure of water, oil, gas, refrigerant and other media. It is widely used in engine management systems, new energy vehicle waterway systems, transmission systems and safety systems. The product has high reliability, high measurement accuracy, and adopts strict process control to ensure excellent quality. The interface can be made according to customer needs, and the output signal can be configured according to customer requirements.

Product Characteristics

1. Product application: used in engines, new energy systems, and transmission systems.
2. Product type: ceramic pressure sensor.
3. Real-time feedback: real-time display of current pressure.

Signal Output

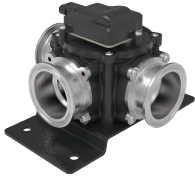
The product measures the medium pressure and converts it into a linear voltage output corresponding to the pressure, generally 0-10bar, and the corresponding output is 0.5V-4.5V; the measuring range and output signal can be customized by the customer.

Item	Parameter
Operating Voltage	5V (anti-reverse connection protection, customizable)
Pressure Measuring Range	0-10bar (customizable)
Maximum Overvoltage	2*FS
Burst Pressure	3*FS
Comprehensive Accuracy	0°C~85°C: ±1 %FS -40°C~0°C/85°C~125°C: ±2 %FS
Measuring Medium	Oil, water and various corrosive liquids and gases
Operating Temperature	-40°C~85°C
Working Current	<15mA
Overvoltage Protection	14~16V
Output Method	Proportional voltage output: 0.5~4.5V
ESD Static Protection	Air discharge: ±15KV, contact discharge: ±8KV
Protection Level	IP67
Interface	Docking: DJ7034Y-1.5-21



Multi-way Valve

Multi-way valves are mainly used in the thermal management systems of automobiles (electric/hybrid/range-extended vehicles/hydrogen fuel cells) and energy storage, and can also be used independently by replacing the outer shell; they are mostly used for energy coupling and distribution between batteries, electric drive/electric control, and heating systems.



Large-Size Water Valve



Three/Four-Way Water Valve



Five-way Water Valve



Seven-way Water Valve

Product Characteristics

1. Product application: Wide voltage range, compatible with passenger vehicles, commercial vehicles and energy storage systems;
2. Product type: three/four/five-way valve.
3. Real-time feedback: real-time feedback of angle and fault.
4. Fault diagnosis: with intelligent self-diagnosis function.
5. Pipeline material: no corrosion and ion precipitation of fluid contact parts, no impact on liquid insulation.
6. Flow characteristics: low flow resistance.

Communication Control

Multi-way valves communicates with the outside world through the CAN/LIN/PWM interface, and sends the angle control target value through the bus. The valve automatically rotates to the target value in response to the target value. At the same time, the bus can feedback the real-time working and fault status of the valve.

Item	Large-Size Water Valve	Three/Four-Way Water Valve	Five-way Water Valve	Seven-way water valve
Operating Temperature	-40-105°C	-40-105°C	-40-105°C	-40-105°C
Operating Voltage	12V/24V	12V/24V	12V/24V	12V/24V
Communication Type	PWM/LIN/CAN/485 Communication	PWM/LIN/CAN	PWM/LIN/CAN	PWM/LIN/CAN
Rated Current	≤1000mA	≤200mA	≤500mA	≤1000mA
Stall Current	≤1600mA	≤600mA	≤800mA	≤1600mA
Internal Leakage	≤30mL/min@150kPa	≤15mL/min@150kPa	≤15mL/min@150kPa	≤15mL/min@150kPa
External Leakage	≤4mL/min@350kPa	≤4mL/min@350kPa	≤4mL/min@350kPa	≤4mL/min@350kPa
Flow Resistance	≤15kPa@300L/min	≤10kPa@50L/min	≤10kPa@50L/min	≤10kPa@50L/min
NVH	≤52dB@50cm	≤45dB@50cm	≤48dB@50cm	≤52dB@50cm
Protection Rating	IP67	IP67	IP67	IP67
Service Life	≥2.2 Million Cycles	≥2.2 Million Cycles	≥2.2 Million Cycles	≥2.2 Million Cycles



Expansion Tank

Expansion tanks are primarily used in traditional gasoline vehicles, pure electric vehicles, hybrid vehicles, fuel cell vehicles, energy storage, and AI liquid cooling systems.

Their main functions include storing coolant or deionized water, providing coolant filling and replenishment for thermal management systems, regulating system pressure, dissipating coolant heat, and monitoring coolant levels. The overall structure consists of a tank body, a level sensor, and a pressure relief valve. Expansion tank assemblies of different shapes and volumes can be customized according to vehicle installation requirements and customer needs.



1.7 Liters



2+1 Liters



3.5+2.5 Liters



8 Liters

Product Characteristics

1. Meets the requirements for automatic refueling of the entire vehicle system, with flexible customization of the fluid replenishment port and degassing interface.
2. Dual-chamber and multi-chamber integrated solutions simplify vehicle installation and layout.
3. Integrated sensors provide convenient plug-in ports.

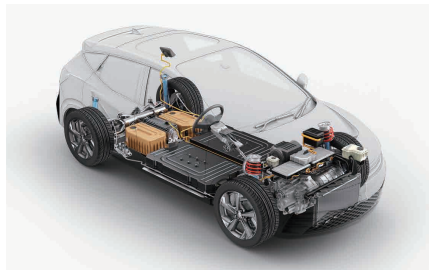


9+1.5 Liters

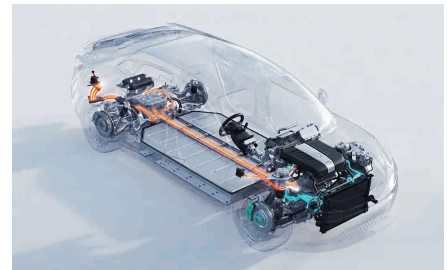
Application Scenario



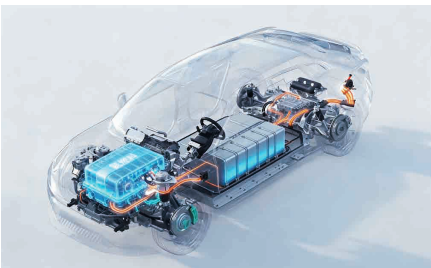
Traditional Fuel-powered Vehicle



Hybrid electric vehicle



Electric vehicle



Hydrogen fuel cell vehicle



Energy Storage



AI Liquid-Cooled Server



Temperature Sensor



Temperature sensors are used to measure the temperature of cooling water, pipelines, battery packs, charging equipment, etc. of new energy vehicles. They can also measure the temperature of high-voltage wiring harnesses, engine oil, excavator hydraulic oil, generators, etc. The temperature sensor has fast response time, high measurement accuracy, good stability and high degree of customization. Over-temperature alarm switches can be added according to customer needs.

Product Characteristics

1. High stability of application environment.
2. Excellent long-term anti-aging stability.
3. High-precision resistance and B constant.

Working Principle

The temperature sensor consists of thermistor element and measurement circuit. The thermistor element is a heat-sensing element of fine ceramic semiconductor. Its resistance value changes with the change of temperature. The corresponding temperature can be determined by measuring the resistance value of the thermistor.

Item	Parameter
Main Material	Stainless steel, brass
Output Signal	560Ω/990Ω/PT1000/2.1K, 5K, 10K, etc.
Alarm Switch	Alarm value 95°C±3°C(can be customized)
Alarm Contact Type	The switch closes as the temperature rises
Alarm Switch Rated Power	1.2W-3W
Rated Voltage	6V-24V
Temperature Alarm Point Tolerance	±3°C
Temperature Measurement Range	-40°C-125/150/185°C
Accuracy	±3°C /±1°C
Working Medium	Water, hydraulic oil, engine oil, etc.
Protection Level	IP67
Insulation Resistance	500V, ≥100MΩ
Thread Specifications	Can be customized according to customers
Connector Model	Delphi P/N:12066016, DT04-2pin, TE 106462



Humidity Sensor



The humidity sensor has a high degree of integration and offers wider compatibility and applicability. It can be used to detect the humidity and parameters of the intake lines of hydrogen-fueled battery engines, fuel engines, gasoline engines, etc. This product adopts digital chips. After being processed by the MCU, the data is output in the form of CAN. It uses the SAE-J1939 universal protocol, making it simpler and more convenient to use.

Product Characteristics

1. Product application: Wide voltage range, compatible with passenger cars and commercial vehicles.
2. Product type: humidity sensor.
3. Real-time feedback: Transmit the current environmental humidity in real time.

Communication Control

The humidity sensor communicates with the outside through the CAN interface and sends the humidity value measured by the sensor via the CAN bus.
 Applicable specification: The CAN communication specification complies with the SAE-J1939 protocol.
 Default baud rate: 250kbps, 500kbps is optional.
 The sensor does not have a terminal resistor.

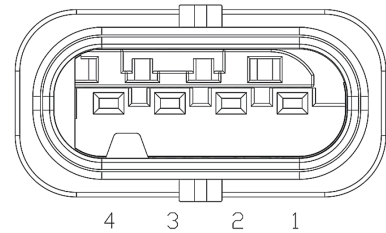
Item	Parameter	Remark
Operating Voltage	9-32V	
Operating Temperature Range	-40-105°C	
Measuring Humidity Range	0-100%	
Humidity Measurement Accuracy	± 3%	±5% (extreme working conditions)
Communication Form	CAN	
Use Media	Air	
Interface	Compatible with TE 2050052-1	Can be customized according to customer needs
Response Time (T63)	<10S	
Weight	50g	

Hydrogen Leakage Sensor



The hydrogen leakage sensor is a key safety component for monitoring hydrogen leakage in hydrogen fuel cell engines, hydrogen storage tanks and gas supply pipeline systems. Its principle is to detect hydrogen concentration by utilizing the characteristics of hydrogen's thermal conductivity changing with concentration. It has a fast response speed to hydrogen concentration changes and can provide real-time and accurate concentration monitoring results.

Pin number	CAN Output	PWM/Vout Output
1	CAN H	Vout signal
2	CAN L	PWM signal
3	GND	GND
4	VCC	VCC



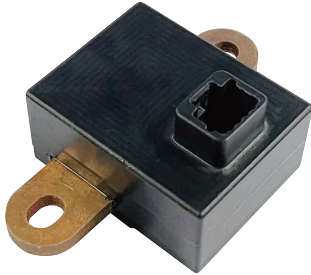
Product Characteristics

1. Product application: hydrogen energy vehicles, pure electric vehicles, commercial vehicles.
2. Product type: Hydrogen leakage sensor (thermal conductivity type).
3. Real-time feedback: Real-time output of hydrogen concentration information.
4. Fault diagnosis: equipped with intelligent self-diagnosis function.
5. Contact response: using thermal conductivity probe, low power consumption, sensitive to hydrogen, safe.

Item	Parameters
Hydrogen Measurement Range	0 - 5 Vol%
Accuracy	H ₂ vol.% in air ≤4%: ±0.4% H ₂ vol.% in air >4%: ±10% of H ₂ concentration
Resolution	0.1 Vol%
Operating Temperature	-40°C-85°C
Storage Temperature	-40°C-95°C
Working Ambient Humidity	0-95%RH
Response Time	(t ₉₀) < 3s
Power Consumption	7.5-32V, Max 50mA
Interface	CAN 250, 500kbps/Voltage/PWM
Output Interval	100ms



Current Sensor



The current sensor is a current measuring device based on the principle of magnetic induction. It has the characteristics of high precision, wide range and fast response, and supports battery charge and discharge current detection and motor current detection. It has overcurrent and anti-reverse connection functions and can be used for current monitoring of battery packs and DC/DC converters of pure electric, hydrogen fuel vehicles, hybrid and other new energy vehicles to ensure the safety and stability of the system.

Product Characteristics

1. Wide voltage range power supply.
2. With overvoltage, overcurrent, anti-surge, anti-reverse connection functions.
3. With forward and reverse charge and discharge current detection.
4. Support analog voltage output function.
5. Meets IPx9K waterproof rating requirements.

Communication Control

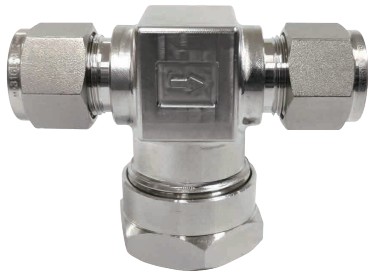
Outputs analog signals and detects external current -300A-300A, corresponding output voltage is 0.5V-4.5V. When no current flows, the bias voltage is 2.5V.

Calculation relationship between sensor output voltage and sampling current: $V_{out} = I_p * 0.00667 + 2.5$.

Item	Parameter
Physical Quantity	Current
Measuring Range	0-±300ADC (can be customized)
Accuracy	±5% F.S
Sensitivity	6.667 mV/A
Operating Voltage	5VDC±5%
Maximum Voltage	28V
Current Power Consumption	< 10mA
Response Time	< 1ms
Output Signal	Analog
Bias Voltage	2.5V
Output Voltage	0.5-4.5V
Output Interface	4 PIN
Copper Bar Size	17mmx4mm(Cross section)
Operating Temperature	-40°C-85°C
Storage Temperature	-40°C-125°C
Working Humidity	95±5% RH
Calculation Formula	$V_{out}=I_p*0.00667+2.5$

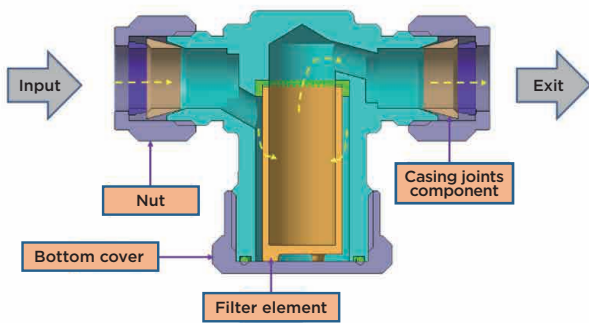


Hydrogen Filter



Hydrogen filter is composed of double casing joints, filter element, bottom cover, main body and other components, according to the system requirements to select different specifications of the filter element to filter the system particulate matter, to ensure the cleanliness of hydrogen in the system, and reduce the harm of dust and particles to the fuel cell. The products have high filtration efficiency and stable quality, and can be used in the field of fuel cell systems for passenger cars and commercial vehicles.

Product Structure



Product Characteristics

1. Primary Material: SUS316.
2. The filter element can be replaced without disassembling the body.
3. Replaceable sintered filter elements.
4. High pressure.
5. Fuel cell systems for passenger cars and commercial vehicles.

DV Test Project

Mechanical shock	Temperature cycle	Pressure cycle
Vibration	Sealing	Cleanliness
Burst pressure	Installation torque	Breaking torque

Item	Parameter
Operating Temperature	-40°C-85°C
Operating Pressure	15±1bar
Max Withstand Pressure	≥20bar
Hydrogen Flow	2.65g/s
Rated Differential Pressure	Max.300mbar@2.65g/s
Filter Particles	>50um
Filtration Efficiency	99.5%
Sealing	3.97*10 ⁻⁷ mbar.L/s @2bar (helium)
Interface at Both Ends	1/2 "Double casing joints



Conductivity Sensor



Fuel cell engines have very high requirements for the conductivity of the coolant, because during the circulation of the coolant, impurities will continue to increase, causing its conductivity to continue to rise, and the insulation performance of the system will decrease. To ensure safety, a conductivity sensor is required to monitor the conductivity of the coolant, and the conductivity is measured using the resistance measurement method based on the principle of electrolytic conductivity.

Product Characteristics

1. Product application: Wide voltage range, compatible with passenger cars and commercial vehicles.
2. Product type: Conductivity sensor (dual-electrode conductivity measurement).
3. Real-time feedback: Outputs an alarm signal when the measured value exceeds the set value.
4. Fault diagnosis: equipped with intelligent self-diagnosis function.
5. Fluid contact materials: Fluid contact parts are corrosion-resistant.

Communication Control

The sensor communicates with the outside through the CAN interface, and sends the measured liquid conductivity value, temperature value and sensor fault status through the CAN bus. At the same time, the sensor conductivity cell constant can be calibrated and the sensor temperature compensation can be adjusted through the CAN bus.

Applicable specifications: CAN communication specifications comply with SAEJ1939 protocol.

Default baud rate: 250kbps, 500kbps optional. The sensor does not have a terminating resistor.

Item	Parameter
Measuring Range	0.01-20 μ S/cm(Can be customized according to customer needs)
Resolution	0.01 μ S/cm
Accuracy	\pm 1.5%FS
Operating Voltage	12V/24V(9-32VDC)
Working Current	<50mA
Overvoltage Protection	36V
Operating Temperature	-40°C-95°C
Work Pressure	<0.6MPa
Calibration Method	Two point calibration
Communication Form	CAN
Use Media	Hydrogen fuel cell cooling water (deionized water)
Protection Level	IP67
Interface	Harness end: Connector model:Sumitomo 6189-1231, Terminal: Sumitomo 8240-0336

