

SPECIAL SEA WATER SOURCE HEAT PUMP UNIT FOR BREEDING

Low energy consumption · High energy efficiency
Corrosion-resistant · Easy to clean



Introduction to the Marine Water Source Heat Pump Unit

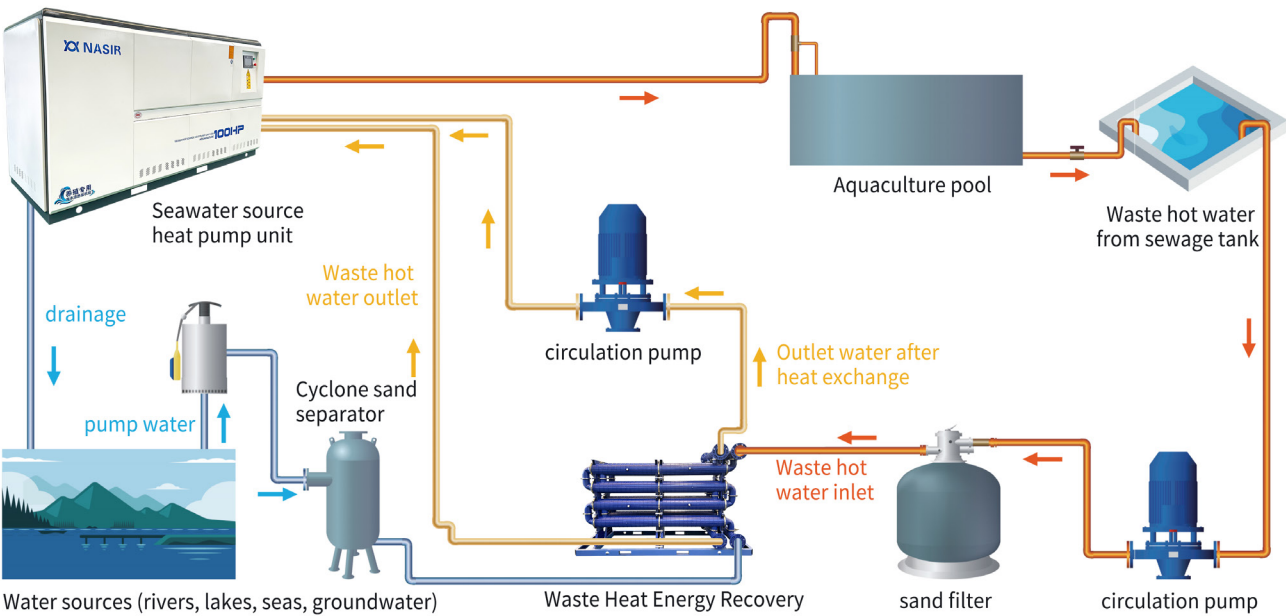
By extracting heat from seawater, this method is environmentally friendly and pollution-free, while simultaneously providing heating for winter aquaculture ponds and cooling for summer ones, effectively addressing water temperature control challenges in aquaculture. It delivers a constant water temperature for industrial-scale farming systems, solving practical problems for farmers and offering broad application prospects. Utilizing heat pump units to supply both heat and cooling for seawater processing represents a low-energy, pollution-free heating and cooling technology that does not deplete groundwater, aligning with China's current energy and environmental policies as well as the strategic requirements for sustainable national economic development.

Unit Advantages

 energy-efficient	 on the safe side	 wear well	 The modular design has a wide range of applications.	 Intelligent Cloud Control System	 Self-regulating temperature The outlet water temperature can be adjusted flexibly.	 Touchscreen control is simple and intelligent.
 Easily handle maximum outlet temperature of 85° C	 Extremely wide range of cold and hot water outlet flow rates	 Tubular continuous spiral baffle heat exchanger	 C&S heat exchanger Further enhance the heat exchange efficiency	 Electronic expansion valve	 Easy to install Save on land area	 Environmental protection and pollution-free

Introduction to the Unit Principle

Flowchart of the Marine Water Source Heat Pump System (Waste Heat Recovery)



Core component

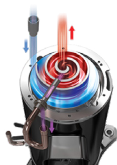
Tubular continuous spiral baffle heat exchanger

Comprehensive corrosion resistance; independently developed and manufactured



Efficient heat exchanger with tube pack

High heat transfer efficiency and safe operation
Small volume ensures excellent oil return efficiency



Imported compressor ensures balanced operation · Maintenance-free

Efficient, quiet, and environmentally friendly
Reliable and low operating costs

Electronic expansion valve, precision control, Class 500

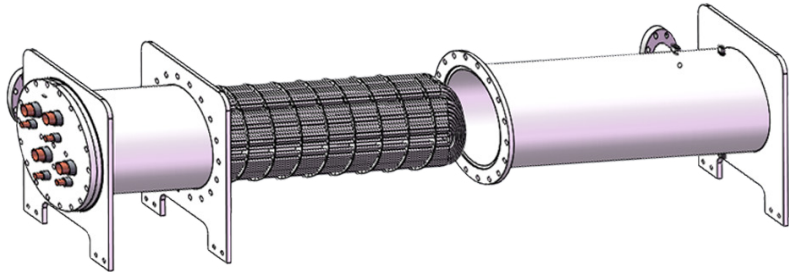
Intelligent, sensitive, and fast-reacting



Tubular continuous spiral baffle heat exchanger

No clogging, no leakage current, anti-scaling, rust-proof, corrosion-resistant, vibration-resistant, low pressure drop, high heat exchange efficiency, and low maintenance costs.

The adoption of U-shaped heat exchange tubes and continuous spiral baffle plates significantly enhances the heat exchange efficiency of the heat exchanger, improves overall system performance, effectively eliminates water flow dead zones, achieves optimal water flow organization and minimized hydraulic resistance, and maximizes thermal exchange between water and cold medium.



- The heat transfer efficiency has been significantly improved, as increasing the velocity is a critical factor in enhancing the heat transfer coefficient.
- Without blockages, at high flow rates, and without blind spots, no sedimentation will occur.
- To prevent scaling, the most effective method is to increase the flow velocity, which is the defining feature of continuous spiral baffle heat exchangers. A high flow velocity effectively slows down the formation of scale on the heat exchange tube walls and can even prevent scaling altogether. This approach also extends the cleaning interval and reduces maintenance costs.
- In a heat exchanger tube bundle, the baffle plate forms a continuous integral structure, resulting in minimal support spans for the heat exchange tubes and stable, pulsation-free fluid flow, thereby effectively preventing tube vibration.
- The application of corrosion-resistant materials has enabled seawater protection against corrosion, biological fouling, and scaling under critical technical conditions, ensuring the system operates efficiently and reliably.
- The heat exchanger adopts a segmented and detachable structural design. During cleaning, only the bolts at the joints need to be removed, followed by extraction of the rear shell for thorough cleaning—a process that is both convenient and cost-effective. An optional observation window is provided for easy monitoring of the water system's cleanliness.

Application of corrosion-resistant materials

Currently, materials used in heat pump equipment on the market suffer unexpected damage when exposed to seawater environments. Addressing this corrosion risk, Naxin has conducted research to develop materials capable of withstanding the harmful effects of marine conditions.

Consider the following factors: the production cost of the material; the performance of the material as specified in the design, along with its corrosion behavior during the corrosion process and the predicted service life under the influence of stress-corrosion interactions; as well as bacteria and biological fouling.

To determine the effectiveness of these materials for application in seawater environments, Naxin evaluated their sensitivity to marine biological corrosion and chemical erosion, selecting corrosion-resistant materials with strong practicality and economic reliability.

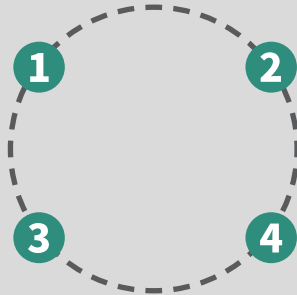
Plate tube – Titanium steel composite plate

The composite material made of titanium and ordinary steel is called titanium-steel composite, combining the corrosion resistance of titanium with the strength of conventional steel plates as structural components.

The titanium surface is passivated by forming a dense, self-healing oxide film, achieving an electrode potential of +0.46 and resulting in corrosion resistance 100 times higher than that of stainless steel.

Heat exchanger tube – Titanium tube

Titanium tubes exhibit high specific strength, excellent corrosion resistance, and superior heat resistance, along with outstanding performance against seawater corrosion and at ultra-low temperatures. The service life of titanium tubes can reach 10 to 20 years.



Shell, baffle plates, support baffles – PP

PP material boasts exceptional characteristics: extremely high impact resistance, corrosion resistance, wear resistance, anti-scaling properties, reduced vibration and noise, freeze crack resistance (operating temperature range: -20° C to 70° C), anti-condensation performance, minimal heat loss, simple installation, and a long service life (up to 50 years).

Base-Galvanized steel plate injection molded

A thick, dense pure zinc layer is deposited on the steel surface, effectively preventing contact between the steel substrate and any corrosive solutions, thereby protecting the steel from corrosion. Additionally, a spray coating process is applied to form a highly adhesive plastic coating, further enhancing the dual-layer protective barrier for superior corrosion resistance and long-term durability.



Quality assurance
one-stop service for sales
and maintenance



Rational design
meticulous R&D, and
continuous innovation



Exquisite workmanship
strictly control the
intelligent manufacturing
process



Lifelong Service
product Full Life Cycle
Service

NXR - 80~800HS

Selection Reference

- Power: 18.7 to 153.2 kW
- Water temperature increased by 5° C
- Water output: 15 to 130 m³/h



Single/dual titanium units

suitable for

- Circulating heating, direct heating
- Thermal insulation for aquaculture water; coil heat exchanger installation in breeding ponds

Set a constant temperature value

- Temperature difference: 0.1° C
- Reduce heat loss in the heat exchanger

Downflow-type seawater source screw generator set

compliant

- Industrialized aquaculture and livestock farming
- Flowers, Vegetables
- Aquaculture, bathing facilities, swimming pools, hotels
- Temperature control of water bodies and spaces.



NXR- 400~2800

(Cold / Hot)
Selection Reference

- Power: 102~423 kW
- Heat generation: 497~2167 kW
- Water discharge rate: 80~351 m³/h

Performance Parameter Table

parameters of the scroll compressor unit

project	model NXR-	80HS	120HS	160HS	200HS	240HS	300HS	400HS	500HS	600HS	800HS
heating capacity kW		92	138	184	193	276	289	385	481.5	576	770
Heating input power kW		18.7	27.6	37.9	38.3	55.1	57.5	76.6	95.8	114.6	153.2
refrigerating output kW		81	121	162	170	242	256	341	427	511	682
Refrigeration input power kW		13.7	20.6	27.5	28.9	41.2	43.4	57.8	72.2	86.5	115.6
comp ressor	source	3P/380V/50Hz									
	type	Fully enclosed, flexible, and highly efficient scroll compressor									
evapo rimeter	type	High-efficiency shell-and-tube heat exchanger / High-efficiency shell-and-tube continuous baffle heat exchanger									
	Connection specification DN	65	65	80	80	100	100	100	150	150	150
	Refrigeration water flow rate: m³/h	13.9	20.8	27.9	29.3	41.6	44	58.7	73.4	87.9	117.3
	Hot water production flow rate: m³/h	8.3	12.5	16.7	17.5	24.9	26.4	35.1	44	52.6	70.3
conde nsator	type	High-efficiency shell-and-tube heat exchanger / High-efficiency shell-and-tube continuous baffle heat exchanger									
	Connection specification DN	65	65	80	80	100	100	100	150	150	150
	Refrigeration water flow rate: m³/h	8.3	12.5	16.7	17.5	24.9	26.4	35.1	44	52.6	70.3
	Hot water production flow rate: m³/h	13.9	20.8	27.9	29.3	41.6	44	58.7	73.4	87.9	117.3
cooling medium		R410A/R134a									
Unit size	long mm	2125	2110	2390	2550	3140	2900	2910	3010	3950	4890
	wide mm	950	950	970	1120	1080	1120	1150	1145	1200	1250
	tall mm	1480	1500	1550	1490	1550	1490	1490	1510	1590	1700
weight of equipment kg		720	840	1000	1100	1200	1600	2100	2600	2830	3200

annotation:

1. The unit's cooling capacity is determined under the following operating conditions: chilled water outlet temperature 7° C, water flow rate 0.172 m³/(h · kW); cooling water inlet temperature 18° C, water flow rate 0.103 m³/(h · kW).

2. The heating capacity of the unit is determined under the following operating conditions: hot water outlet temperature 45° C, with a flow rate identical to that of cold water under nominal cooling conditions; cold water inlet temperature 15° C, with a flow rate identical to that of cooling water under nominal cooling conditions.

3. The water-side fouling coefficient is: 0.086 m² · °C /kW;

4. The water-side design of the evaporator/condenser withstands a pressure of 0.6 MPa;

5. Specification parameters will be continuously updated due to technical advancements. Please contact your local office for confirmation when placing an order; no separate notice will be provided.

Comparison of Operating Costs

Taking the heating of one ton of water as an example: A comparison of operating costs for various hot water supply methods

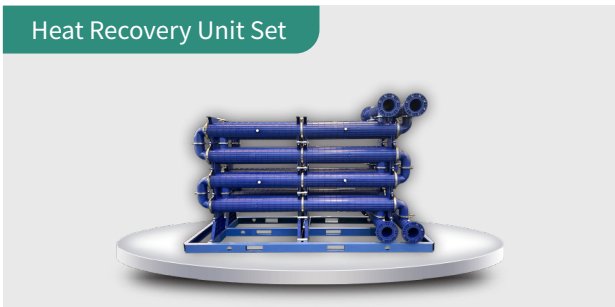
device type	natural gas boiler	Biological pellet boiler	coal burning boiler	oil burning boiler	Air-source heat pump unit	Sea-water source heat pump unit	Waste heat energy recovery unit
Fuel Price	4.0 yuan/m ³	0.9 yuan /kg	1.8 yuan /kg	8 yuan /kg	0.6 yuan per degree	0.6 yuan per degree	0.6 yuan per degree
fuel value	8600kcal/m ³	3500kcal/kg	7000 kcal/kg	10200kcal/kg	860 kcal/kWh	860 kcal/kWh	860 kcal/kWh
availability factor	92%	83%	70%	85%	400%	580%	980%
fuel consumption	3.54m ³	9.64kg	5.71kg	3.23kg	8.14 degrees	5.6 degrees	3.3 Degree
Fuel cost	14.2 yuan	8.7 yuan	10.3 yuan	25.8 yuan	4.9 yuan	3.4 yuan	2 yuan
Temperature increase of 1° Crequired expenses	0.51 yuan	0.31 yuan	0.36 yuan	0.92 yuan	0.18 yuan	0.12 yuan	0.07 yuan

annotation:

- 1. To heat water from 0° C to 28° C, one ton of water requires 28,000 kcal of energy;
- 2. The unit price for electricity is calculated at RMB 0.6 per kWh, natural gas at RMB 4 per m³, and coal at RMB 1,800 per ton;
- 3. The efficiency of the air-source heat pump was measured at an outdoor ambient temperature of 7° C (International).
- 4. Bio-pellet boilers have a short service life and incur higher flue gas dust treatment costs. Environmental authorities require that dust treatment equipment be replaced every two years. Additionally, the supply of pellets is unstable and their prices fluctuate. Moreover, these boilers can still use coal, wood, or other fuels.

Waste Heat Energy Recovery System

The modular low-temperature-difference waste heat recovery unit utilizes the temperature difference between two media to achieve heat transfer through thermal exchange. During this process, no physical matter is transferred; instead, the high-temperature object releases heat, resulting in a decrease in its temperature and internal energy, while the low-temperature object absorbs heat, leading to an increase in its temperature and internal energy—all without requiring additional energy consumption. This solution addresses the technical challenges associated with traditional heat exchangers, such as susceptibility to clogging and scaling, poor corrosion resistance, stringent water quality requirements, and high maintenance costs.



Unit Advantages

- The modular design allows flexible assembly and meets ultra-wide water volume heat exchange requirements (20–480 cubic meters).
- The innovative integral mold-cast barrel features an ultra-wide temperature range (-10 ° C to 70 ° C), high pressure resistance coefficient (≤ 0.625 MPa), durability, and food-grade material construction. It is suitable for various industrial applications—including tailwater treatment, food processing, petroleum, and chemical industries—as well as energy recovery and reuse.
- The innovative clamp-type fastening connection offers convenient installation, stable reliability, easy maintenance and cleaning, as well as effortless assembly and disassembly.
- An innovative internal pull-out type heat exchanger, featuring anti-scaling properties, non-clogging performance, and the ability for repeated extraction for cleaning or direct replacement.

- The small-cylinder heat exchange design features a longer process path, higher heat transfer efficiency, and more energy-efficient operation.
- Touch control, simple and intelligent design; features automatic temperature regulation, automatic backwashing, and integration with filtration systems.

Performance Parameter Table

model	SSHRQ-60/80	SSHRQ-120	SSHRQ-160	SSHRQ-240	SSHRQ-320
Heat Exchange Process	1*4/1*5 Stepwise heat exchange process	2*4-stage cascade process heat exchange	2*5 Stepwise Process Heat Exchange	4*4-stage cascade heat exchange process	4*5 Stepwise heat exchange process
Primary hydrocephalus volume	20-50m³/h	30-70m³/h	40-80m³/h	60-140m³/h	80-160m³/h
Primary hydrodynamic resistance	72kPa	54kPa	72kPa	54kPa	72kPa
Secondary water volume	20-50m³/h	30-70m³/h	40-80m³/h	60-140m³/h	80-160m³/h
Secondary water resistance	78kPa	58.5kPa	78kPa	58.5kPa	78kPa
design pressure	0.5MPa	0.5MPa	0.5MPa	0.5MPa	0.5MPa
hydraulic testing	0.625MPa	0.625MPa	0.625MPa	0.625MPa	0.625MPa
design temperature	50°C	50°C	50°C	50°C	50°C
working temperature	≤ 50°C	≤ 50°C	≤ 50°C	≤ 50°C	≤ 50°C
Material of the heat exchange tube	TA1	TA1	TA1	TA1	TA1
Cylinder material	PP	PP	PP	PP	PP
Unit size	3005*603*1852/2151	3005*900*1852	3005*900*2151	3005*1810*1852	3005*1810*2151



Energy-saving and environmental protection



Anti corrosion design



efficient heat exchange



exquisite craftsmanship



quality after-sales service

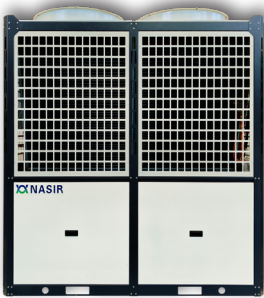
Air Source Heat Pump Unit For Aquaculture

In the absence of underground water sources, air-source heat pump units can be utilized to provide heating and cooling for water use within aquaculture facilities, greenhouses, and fish farms, as well as to supply hot water for hotels and bathing facilities.

Its working principle involves using electrical energy to drive a compressor that extracts heat from the air and releases it into the space requiring insulation. The unit can start normally at-35° C and operate effectively at-25° C.

Unit Advantages

- The power range spans from 35 kW to 1680 kW, offering high flexibility during system configuration, which facilitates energy regulation and easy capacity expansion. Operations such as transportation, installation, commissioning, and maintenance are straightforward.
- Equipped with an imported fully enclosed flexible scroll compressor, it features fewer operating components and operates quietly. The compressor employs staged startup, reducing the impact of starting current on the power grid, thereby enhancing safety and reliability.
- The fan employs a specially designed axial-flow motor and blades, ensuring smooth operation and low noise levels.
- The high-efficiency, innovative shell-and-tube titanium tube heat exchanger employs a distributor for liquid distribution, ensuring uniform refrigerant allocation along the tube side and maximizing heat exchange area utilization.
- The product is detachable and washable, making maintenance convenient with no lingering concerns.
- Built-in PP material baffle: It maintains a minimal clearance with the heat exchange tubes and fits tightly against the cylinder, effectively preventing cross-flow and enhancing heat transfer efficiency.
- With a high degree of automation and comprehensive functionality, it enables management of unit start-stop procedures, timed control, pump operation, intelligent defrosting, intelligent anti-freezing, and full-range fault alarms.
- Equipped with an RS485 communication interface, it enables users to perform centralized and remote monitoring of the unit.



Standard Air Source Heat Pump Unit Parameter Table

Unit Model		NXFR-40	NXFR-80	NXFR-90	NXFR-180
Heating Operating Condition 1 Environmental temperature: 7° C / Outflow temperature: 45° C	heating capacity kW	35	69	74	147
	Heating input power kW	10.6	20.9	22.2	44.5
Heating Operating Condition 2 Environmental temperature: 0° C / Outflow temperature: 41° C	heating capacity kW	29	58	61	121
	Heating input power kW	9.5	18.9	19.9	39.5
Refrigeration operating conditions Environmental temperature: 35° C / Outflow temperature: 7° C	refrigerating output kW	32	64	66	132
	Refrigeration input power kW	11.5	22.9	23.5	47.6
Number of compressors	Table	1	2	1	2
source	V/Ph/Hz	380V/3Ph/50Hz			
Heating operation ambient temperature range	°C	-10 ~ 28°C			
Refrigeration operating ambient temperature range	°C	16 ~ 49°C			
cryogen		R410A			
safeguard	-	High and low voltage protection, freeze protection, overload protection, water flow protection, etc.			
Throttling method	-	Electronic expansion valve			
fan	type	High-efficiency, low-noise axial flow fan			
	power kW	0.35*2	0.35*4	0.35*4	2.2*2
	quantity	2	4	4	2
Water-side heat exchanger	type	High-efficiency shell-and-tube heat exchanger			
	Water flow rate: m³/h	5.5	11	11.4	22.8
	waterpipe joint	DN50	DN65	DN65	DN80
outline dimension	long mm	1400	1880	1880	2250
	wide mm	800	850	850	1280
	tall mm	2170	2370	2370	2500
weight	kg	430	700	650	1060

annotation:

Heating Condition 1: Outdoor dry/wet bulb temperatures are 7/6° C, with an outlet water temperature of 45° C; Heating Condition

2: Outdoor dry bulb temperature is 0° C, with an outlet water temperature of 41° C.

Refrigeration operating conditions: outdoor dry/wet bulb temperatures of 35/24° C, outlet water temperature of 7° C;

Parameter Table for Low-Temperature, High-Heat Air Source Heat Pump Units

Unit Model		NXFR-40C	NXFR-80C	NXFR-90C	NXFR-180C
Heating Operating Condition 1 Environmental temperature: 7° C / Outflow temperature: 45° C	heating capacity kW	38	77	84	168
	Heating input power kW	11.2	22.8	24.4	48.9
Heating Operating Condition 2 Environmental temperature: -12° C / Outflow temperature: 41° C	heating capacity kW	25	50	54	108
	Heating input power kW	10.1	20.2	21.6	43.1
Heating Operating Condition 3 Environmental temperature: -20° C / Outflow temperature: 41° C	heating capacity kW	20	41	45	88
	Heating input power kW	9.8	20.1	21.8	42.5
Refrigeration operating conditions Environmental temperature: 35° C / Outflow temperature: 7° C	refrigerating output kW	31	62	66	132
	Refrigeration input power kW	11.1	22.2	23.5	47.6
Number of compressors	Table	1	2	1	2
source	V/Ph/Hz	380V/3Ph/50Hz			
Heating operation ambient temperature range	°C	-35 ~ 28°C			
Refrigeration operating ambient temperature range	°C	16 ~ 49°C			
cryogen		R410A			
safeguard	-	High and low voltage protection, freeze protection, overload protection, water flow protection, etc.			
Throttling method	-	Electronic expansion valve			
fan	type	High-efficiency, low-noise axial flow fan			
	power kW	0.35*2	0.35*4	0.35*4	2.2*2
	quantity	2	4	4	2
Water-side heat exchanger	type	High-efficiency shell-and-tube heat exchanger			
	Water flow rate: m³/h	5.4	10.7	11.4	22.8
	waterpipe joint	DN50	DN65	DN65	DN80
outline dimension	long mm	1400	1880	1880	2250
	wide mm	800	850	850	1280
	tall mm	2170	2370	2370	2500
weight	kg	470	750	700	1150

annotation:

Heating Condition 1: Outdoor dry/wet bulb temperatures are 7° C/6° C, with an outlet water temperature of 45° C; Heating Condition 2: Outdoor dry/wet bulb temperatures are -12° C/-14° C, with an outlet water temperature of 41° C. Heating mode 3: Outdoor dry-bulb temperature is -20° C, outlet water temperature is 41° C; Refrigeration mode: Outdoor dry/wet-bulb temperatures are 35° C/24° C, outlet water temperature is 7° C.

Heating mode 3: Outdoor dry-bulb temperature is -20° C, outlet water temperature is 41° C; Refrigeration mode: Outdoor dry/wet-bulb temperatures are 35° C/24° C, outlet water temperature is 7° C.

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