dynamic temperature control system for process control

Dynamic temperature control system is a high-precision fluid temperature control equipment integrating compressor refrigeration and electric heating, which is able to realize rapid, stable and programmable temperature rise and fall operation in a wide temperature range.

Dynamic Temperature Control System

The dynamic temperature control system is designed to connect loads such as reactors, micro-reactors, test units, and more. It is essential for high-end process development, pharmaceutical production, new material research, and other advanced applications. With full temperature zone refrigeration, intelligent control, real-time process tracking, programmed curve control, and electronic data management, this system provides comprehensive solutions for complex temperature control needs.

Features

1. **Ultra-wide temperature control range:** Covers -80°C to +200°C, meeting both deep cooling and high temperature process requirements.
2. **High-precision control capability:** Temperature fluctuation less than ± 0.2°C, suitable for high stability requirements.

3. **Full temperature zone start refrigeration:** Refrigeration can be started at any temperature point, with no cold zone limitation.
4. **Multi-mode refrigeration switching:** Choose from continuous, automatic, or prohibited refrigeration modes according to process needs.
5. **Dual-control mechanism:** Supports both “internal temperature control” (fluid temperature) and “process temperature control” (reactant temperature via external sensors).
6. **Uniform temperature function:** Ensures linear and controllable temperature change, ideal for sensitive processes.
7. **Program temperature control system:** Create up to 10 groups of temperature programs, each with 100 segments, supporting complex curve control.
8. **Data security and management:** Logs all operations and faults; supports USB export/import, electronic signatures, and three-level authority management for GMP environments.
9. **Intelligent man-machine interface:** 7-inch high-definition touch screen displays set values, actual values, alarms, and system status in real time.
10. **Multi-point safety protection:** Complies with GB 4793.6 and IEC 61010-2-010; features mechanical over-temperature protection for equipment and experiment safety.

Working Principle

1. **Heat carrier circulation:** Transmits heat carriers (e.g., heat transfer oil, water-ethanol mixture) in a closed loop to exchange heat with the target equipment (e.g., reactor jacket).
2. **Refrigeration:** Compressor compresses refrigerant to high-temperature/high-pressure gas, which condenses, is throttled, and evaporates to absorb heat from the carrier for cooling.
3. **Heating:** Electric heater quickly warms up the heat carrier, which is circulated to the controlled equipment.
4. **Control:** PID temperature controller dynamically adjusts heating and cooling power based on user settings for precise temperature management.
5. **Internal control mode:** Uses outlet fluid temperature as the control target.
6. **Process control mode:** Uses Pt100 sensor inside the reactor to control temperature based on reactant temperature feedback.

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Model	**DTC10-6W**	**DTC10-6**	**DTC20-6W**	**DTC20-6**
Temperature range	-80°C to +200°C		-50°C to +200°C	
Temperature stability	±0.5°C			

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Model	DTC10-6W	DTC10-6	DTC20-6W	DTC20-6
Display	7 inch touchscreen			
Temperature display resolution	0.01°C, 0.1°C, 1°C			
Internal temperature sensor	pt100			
Process Temperature Sensor	pt100 4-wire, optional			
Communication interface	USB, RS485, RS232, RJ45			
Heater Rated Power	6kw		7.5kw	
Cooling power	3kw at 200°C 50°C and 0°C, 2.8kw at -20°C, 2.6kw at -40°C, 1.35kw at -60°C, 0.21kw at -80°C		5kw at 200°C and 50°C, 3.7kw at 0°C, 3.1kw at -20°C, 1.2kw at -40°C, 0.3kw at -50°C	
Cooling method	water cooling	air cooling	water cooling	air cooling
refrigerants	R404A, R23		R404A	

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Model	DTC10-6W	DTC10-6	DTC20-6W	DTC20-6
Circulation pump type	magnetic drive			
Circulation pump Flow rate	30L per minute		45L per minute	
Circulation pump Pressure	2bar		1.4bar	
Circulation Interface Size	G3/4			
Maximum viscosity of the heat-carrying medium	30cp			
Cooling water connection pipe size	Rc1/2		Rc1/2	
Cooling water flow	15L per minute		15L per minute	
Heat-carrying medium filling volume	6L			
Heat-carrying medium expansion tank capacity	8L			

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Model	**DTC10-6W**	**DTC10-6**	**DTC20-6W**	**DTC20-6**
protection class	IP20			
contamination level	2			
Environmental temperature	5°C to 35°C			
Power supply	380Vac, 50Hz, 3 phase			
External dimensions	685Wx860Dx1626H mm			
Weight	260kg	280kg	230kg	250kg