SMC

CHILLERS FOR BIOTECHNOLOGY AND ANALYTICAL INSTRUMENTS

Precision cooling for life-changing science

Expertise
Passion
Automation

Biotechnology and analytics is transforming global healthcare and industry

The biotechnology sector is expanding at remarkable speed as breakthroughs in **cell therapies, biopharmaceuticals, genetic engineering, and advanced diagnostics accelerate global demand for controlled, reliable laboratory and production environments**. Industry projections estimate that the global biotech market will exceed €1 trillion by 2030, reflecting its central role in healthcare, food security, and sustainability.

As research intensifies and production scales up, **the need for precise temperature control has become more critical than ever**. Temperatures even slightly outside the required range can influence cell viability, enzymatic reactions, sample stability, and analytical accuracy. This is why bioprocess labs and analytical instrument manufacturers increasingly depend on chillers engineered for high stability, low vibration, and exceptional energy efficiency.

SMC solutions for temperature control

Your partner to chill your problems in life science

Biotechnology and analytical laboratories rely on **tightly controlled environments to ensure accuracy, repeatability, and product integrity**. As processes become more automated and sensitive, the need for reliable temperature regulation, stable gas management, and clean fluid handling grows across multiple areas of modern life sciences. The following key applications highlight where precise and sustainable cooling solutions play a critical role.

Analysis

Stable cooling for high heat-load sources, improving measurement reproducibility

High-precision laboratory instruments depend on temperature stability to ensure repeatable performance. Systems like PCR machines, DNA sequencers, HPLC/UHPLC, mass spectrometers, and spectrophotometers generate heat from optical modules, detectors, pumps, and power supplies. **Thermal drift can lead to measurement deviations, noise, or instrument downtime.**

SMC temperature controller unit provide **consistent cooling** to instrument housings, optical components, ion sources, columns, vacuum pumps, and electronic modules, ensuring **accurate temperature control**, reduced drift, and enhanced repeatability — essential for both research labs and instrument manufacturers. **Low-GWP [1] and CO_2 chillers are especially valuable where environmental compliance is a priority.**

1) Global Warming Potential.

Applications

- Spectrometers
- Emission analysers
- Atomic absorption spectrophotometer.

Cooling examples

- RF coil
- Torch holder
- Graphite furnace
- Plasma torch
- Optical system
- Power supply
- Light source.

Stable cooling for high heat-load sources, improving measurement reproducibility

High-precision analytical instruments require stable thermal conditions to maintain accuracy and repeatability. Systems such as PCR machines, DNA sequencers, HPLC/UHPLC units, mass spectrometers, and spectrophotometers generate continuous heat from optical modules, detectors, pumps, ion sources, and power electronics. Without proper cooling, this heat can cause thermal drift, measurement errors, increased noise, or even instrument downtime.

SMC chillers deliver consistent, low-vibration cooling to critical components including instrument housings, optical assemblies, columns, vacuum pumps, and electronic modules. By maintaining precise temperature control, they help ensure stable baselines, reproducible results, and long-term instrument reliability. Low-GWP and CO2 refrigerant models also provide a sustainable option for labs and OEMs with environmental targets.

HRSC Series

Non F-Gas (CO_2 refrigerant) refrigerated thermo-chiller

- Up to 11.5 kW cooling capacity
- Uses natural refrigerant (CO_2) with GWP=1
- Temperature stability: 0.1 °C
- Set temperature range:
  - HRSC012~090: 5 to 40 °C (High temperature option for air-cooled 5 to 45 °C)
  - HRSC100: 5 to 35 °C.

HRSF Series

Low GWP refrigerant, standard type circulating fluid temperature controller

- Cooling capacity: from 1.1 to 20.6 kW (50 Hz)
- Low GWP refrigerant (R454C): GWP=146
- Temperature stability: ±0.1 °C
- Set temperature range: 5 to 40 °C.

HRLF Series

Low GWP refrigerant, standard type circulating fluid temperature controller

- Cooling capacity: from 1.1 to 20.6 kW (50 Hz)
- Low GWP refrigerant (R454C): GWP=146
- Temperature stability: ±0.1 °C
- Set temperature range: 5 to 40 °C.

Microscopy/ Imaging

Suppresses thermal drift for high-resolution imaging

High-resolution microscopy and advanced imaging systems rely on exceptional thermal stability to deliver crisp, accurate results. Heat generated by electron guns, optical assemblies, detectors, X-ray modules, and vacuum systems can create thermal drift that reduces image quality and affects measurement precision. **Maintaining these components at stable operating temperatures is essential** for reliable imaging performance, especially during long acquisitions or high-magnification work

SMC chillers provide precise, low-vibration cooling to the critical subsystems of microscopy and imaging platforms, helping suppress thermal drift and ensuring stable focus, alignment, and resolution. They integrate seamlessly into cooling loops for electron optics systems, X-ray spectrometers, imaging detectors, sample stages, and power supplies, supporting continuous operation in demanding research and analytical environments.

Applications

- Microscopes/SEM
- Emission analysers
- Atomic absorption spectrophotometer.

Cooling examples

- Electron gun
- Electron optic system
- X-Ray spectrometer/Tube
- Power supply
- Detector.

Suppresses thermal drift for high-resolution imaging

High-resolution microscopy and imaging systems depend on **stable thermal conditions** to maintain clarity, focus, and measurement accuracy. Components such as electron guns, optical assemblies, detectors, X-ray modules, and vacuum systems generate heat that can cause thermal drift and reduce image quality. To ensure consistent performance—especially during long or high-magnification sessions—precise temperature control is essential.

SMC chillers deliver low-vibration, high-precision cooling for these sensitive subsystems, integrating easily into cooling loops for electron optics, spectrometers, sample stages, and power supplies.

HEF Series

Peltier-type chiller

· Cooling capacity: 220 W
· Temperature stability: ±0.1 °C
· Set temperature range: 10 to 60 °C.

HECR Series

Peltier rack-mounted type

· Cooling capacity: 0.8 to 1.2 kW
· Temperature stability: ±0.01 to ±0.03 °C
· Set temperature range: 10 to 60 °C.

HRSC Series

Non F-Gas (CO_2 refrigerant) refrigerated thermo-chiller

· Up to 11.5 kW cooling capacity
· Uses natural refrigerant (CO_2) with GWP=1
· Temperature stability: 0.1 °C
· Set temperature range:
  - HRSC012~090: 5 to 40 °C (High temperature option for air-cooled 5 to 45 °C)
  - HRSC100: 5 to 35 °C.

HRR Series

Rack-mounted type

· Cooling capacity: 0.95 to 5 kW (50 Hz)
· Temperature stability: ±0.1 °C
· Set temperature range: 5 to 35 °C; 15 to 35 °C (HRR010).

Cold chain & Sample preservation

Applications

· Rotary evaporator
· Auto sampler.

Cooling examples

· Cooling condenser
· Sample rack
· Volatile sample.

Reliable temperature control for continous operation and process stability

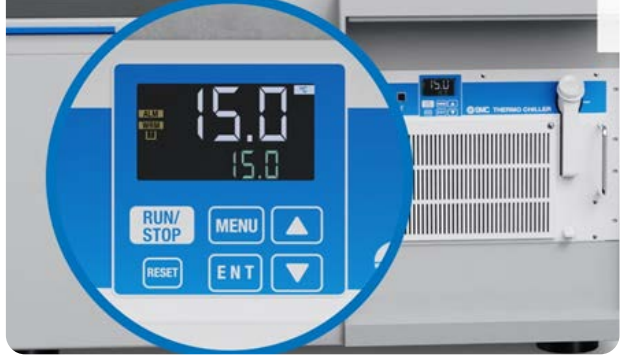
Many biological samples — from enzymes and reagents to clinical specimens — degrade rapidly when exposed to uncontrolled temperatures. **Cold storage units, benchtop coolers, and preparation stations all require stable thermal conditions to prevent loss of activity or structural changes**. During sample transport within automated platforms or analytical systems, local cooling is often necessary to maintain exact temperatures.

SMC chillers **support pre-analytical and post-analytical cooling stages, supplying precise temperature control** to reagent reservoirs, buffer tanks, sample racks, cold plates, and preparation modules. **Their low-GWP and CO_2-based models offer sustainable cooling performance without compromising the stability required to maintain sample integrity.**

Temperature control of samples & reagents

Maintaining a constant sample temperature is a key step in many analytical processes. With SMC chillers, maintaining a constant temperature is very easy thanks to the precision of our chillers.

Thermal control in the reagent chambers helps to preserve reagent shelf life.



HRRF Series

Rack-mounted type

· Cooling capacity: 1 to 1.6 kW (50 Hz)
· Temperature stability +- 0.1
· Set temperature range: 5 to 35 °C.

HEF Series

Peltier-type chiller

· Cooling capacity: 220 W
· Temperature stability: ±0.1 °C
· Set temperature range: 10 to 60 °C.

HEC Series

Peltier-type chiller

· Cooling capacity: 140 W to 1200 W
· Temperature stability: ±0.01 °C to ±0.03 °C
· Set temperature range: 10 to 60 °C.

HECR Series

Peltier rack-mounted type

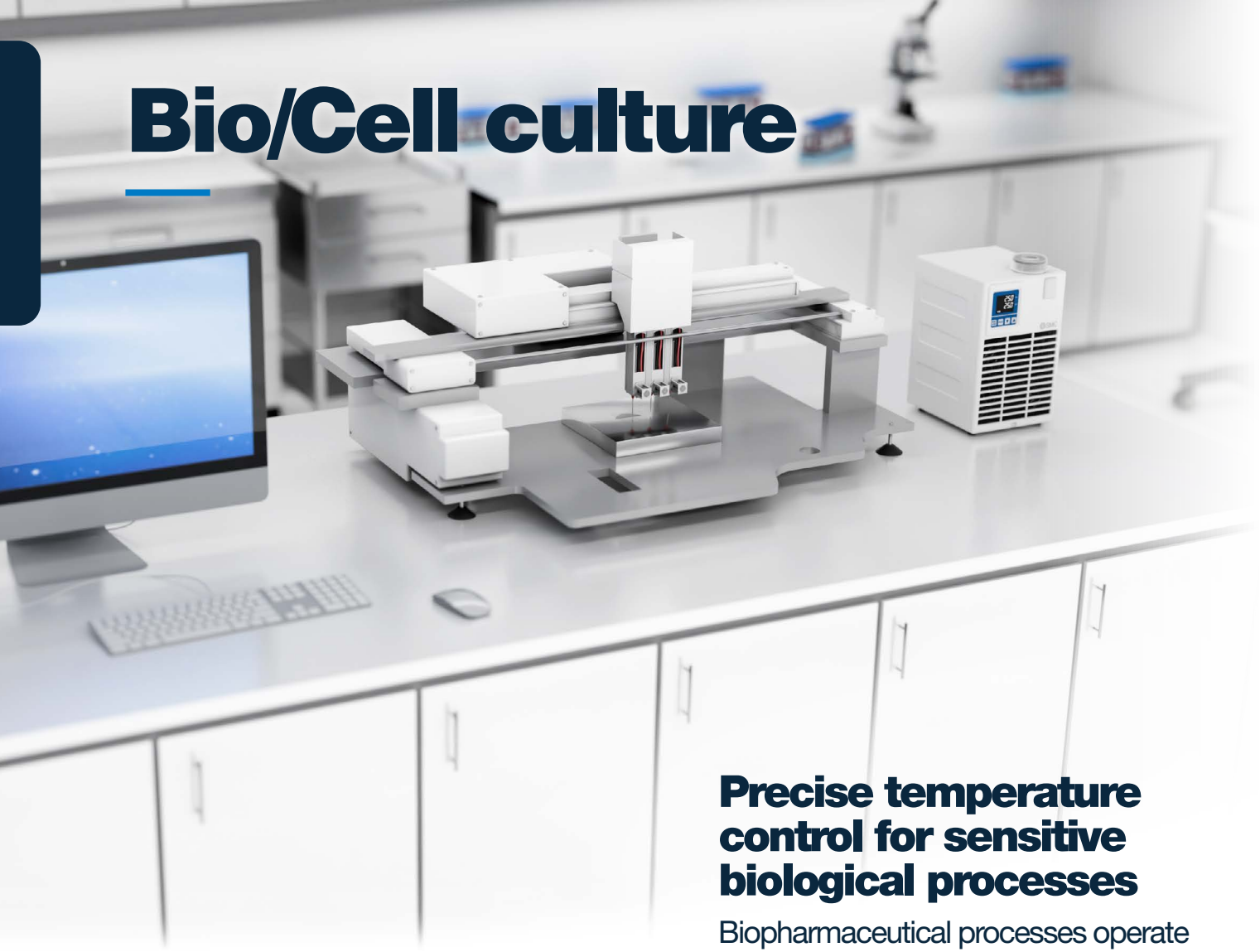
· Cooling capacity: 0.8 to 1.2 kW
· Temperature stability: ±0.01 to ±0.03 °C
· Set temperature range: 10 to 60 °C.

HEB Series

Liquid tank for thermoelectric bath

· Cooling capacity: 140 W
· Temperature stability: ±0.01 °C
· Set temperature range: -15 to 60 °C.

Bio/Cell culture



Precise temperature control for sensitive biological processes

Biopharmaceutical processes operate within tight thermal windows where even minor temperature deviations can affect cell health, reaction kinetics, and final product quality. During cell culture, chillers help remove excess metabolic heat and maintain stable temperatures inside incubated vessels. In fermentation, large volumes generate continuous heat that must be efficiently extracted to keep organisms within optimal growth ranges.

During purification, particularly in downstream chromatography and filtration steps, chillers support the thermal stability needed for consistent separation and protein integrity. SMC chillers integrate directly into bioreactor jackets, fermenter cooling loops, purification skids, and buffer conditioning units, ensuring reliable, continuous performance while supporting low-GWP sustainability targets.

Applications

· Biorreactors
· Automated cell culture.

Cooling examples

· Fermentation heat
· Culture medium.

Temperature control

Precise temperature control is essential for maintaining optimal conditions in bioreactors, ensuring cell viability and process efficiency.

At SMC, we offer advanced solutions such as high-stability thermal control units, Peltier-based systems, and high-capacity cooling options. Our products provide reliable and precise temperature regulation, meeting the stringent standards of the biopharmaceutical industry. For applications requiring environmental compliance, we offer selected models that are compliant with F-GAS regulations.

HRSC Series +

Non F-Gas (CO_2 refrigerant) refrigerated thermo-chiller

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· Uses natural refrigerant (CO_2) with GWP=1
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· Set temperature range:
  - HRSC012~090: 5 to 40 °C (High temperature option for air-cooled 5 to 45 °C)
  - HRSC100: 5 to 35 °C.

HEF Series +

Peltier-type chiller

· Cooling capacity: 220 W
· Temperature stability: ±0.1 °C
· Set temperature range: 10 to 60 °C.

HRSF Series +

Low GWP refrigerant, standard type circulating fluid temperature controller

· Cooling capacity: from 1.1 to 20.6 kW (50 Hz)
· Low GWP refrigerant (R454C): GWP=146
· Temperature stability: ±0.1 °C
· Set temperature range: 5 to 40 °C.

HECR Series +

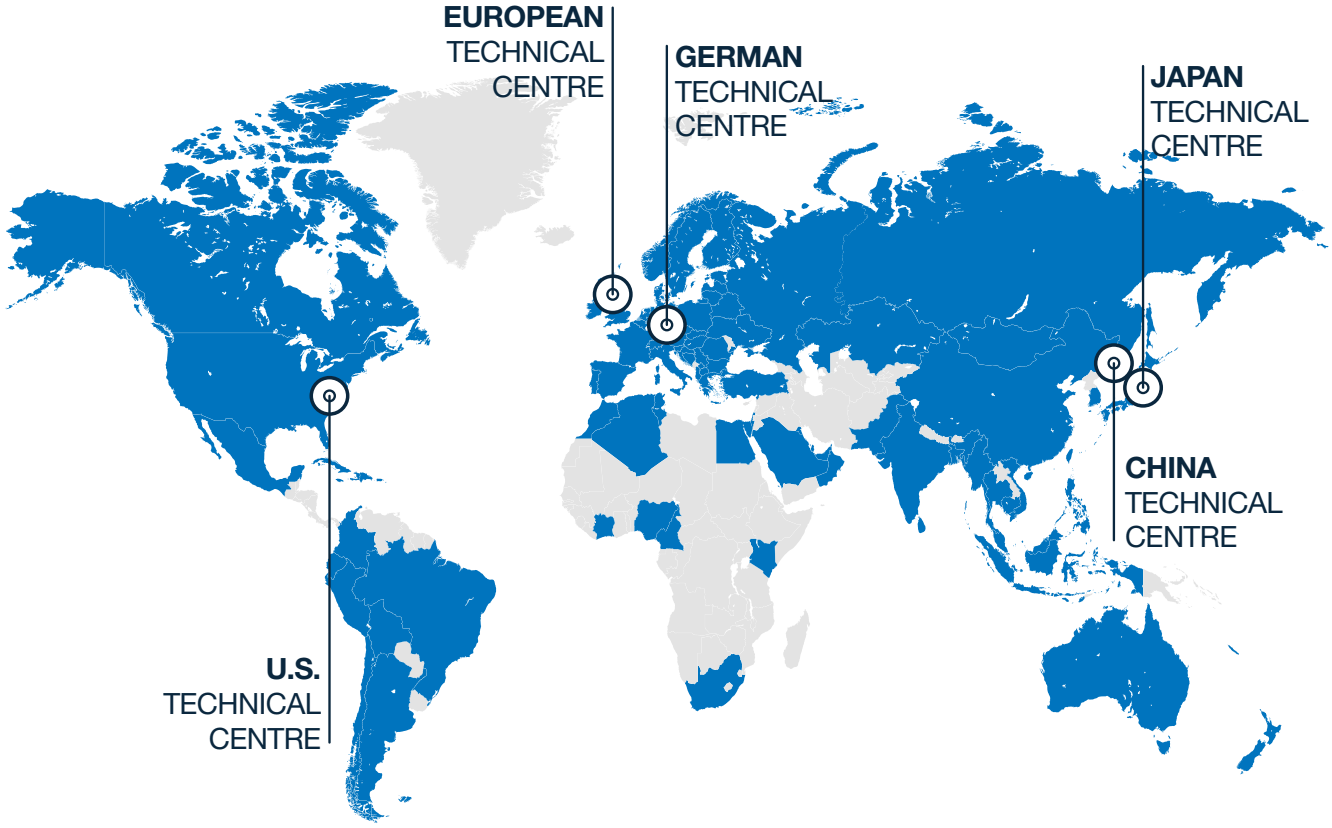
Peltier rack-mounted type

· Cooling capacity: 0.8 to 1.2 kW
· Temperature stability: ±0.01 to ±0.03 °C
· Set temperature range: 10 to 60 °C.

Our support network

SMC's worldwide commitment

One of the things we do best at SMC is **being close to our customers**. Local support, on a global scale.



With **support** in over **500 locations** across **80 countries** and regions **worldwide**, our sales force of **7000 experts** maintains **close communication with customers**.

SMC Business Continuity Plan

Sustainable growth also means ensuring uninterrupted operations

We are committed to ensuring that SMC is prepared for any emergency and that our business activities will not stop in the event of such circumstances. SMC aims to fulfil our product supply responsibilities and maintain our customers' trust by contributing to both sustainable growth and the expansion of technological innovations.

SMC, as a comprehensive manufacturer of automatic control equipment that supports automation, is able to promptly provider products that meet our customers' needs anywhere in the world.

Production BCP
Ensure customer order fulfilment

Reliable delivery for you thanks to our 9 global logistic centres and 38 production sites worldwide. Moreover, flexibility to rapidly respond to any sudden change in the manufacturing environment.

Finance BCP
Safe & Solid financial base

In the event of an emergency, SMC can provide a safe and solid financial base (with cash, deposits, and equity capital) that will sufficiently cover the working capital and funds needed to rebuild buildings and the equipment required for business continuity. This is done to provide peace of mind to our customers and workers alike.

Information security BCP
Vital data kept safe

Strengthen information security for protection against computer viruses and cyberattacks, plus the installation of data centres to establish a disaster recovery system. Your information is safe with us.

Engineering BCP
Consistent technical support

2,000 engineers at our 5 technical centres around the globe.

Sales BCP
Consistent sales support

7,000 sales engineers worldwide ready to recommend the best solution for you. Over 80 global locations to make sure that wherever you are, we are there too.

Discover more

Expertise
Passion
Automation

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