VWR
We Enable Science

VWR Collection Equipment Application Guide for Education & Medical Research and Healthcare

Temperature Control Solutions Overview

PRODUCT HIGHLIGHTS

VWR® Refrigerated Recirculating Chillers: Ranging from 1/4 to 1HP, these chillers are equipped with large, dual displays which present temperature and pressure or flow rate simultaneously and provide cooling at ambient temperatures as high as 35°C. User-adjustable temperature, pressure, and flow rate alarms and optional external temperature tracking and communications capabilities enhance user experience. Included with all 3/4HP and 1HP chillers is the patent-pending WhisperCool® technology, which automatically adjusts the cooling fan speed to match the demand put on the system. This feature makes performance exceptionally quiet and environmentally friendly.

Circulating Baths: Precise and reliable, with sleek lines and large, intuitive digital displays, these VWR® Circulating Baths are exceptionally hard-working and easy to operate and maintain. With refrigerated models with temperature ranges of -40° to 200°C and heat only models with ranges from ambient +10° to 200°C, and temperature stabilities as precise as ±0.01°C, these circulating baths provide the specifications and reliability necessary for almost any application.

Benchtop Chillers: Environmentally friendly, economical alternatives to tap-water cooling. Maximize precious bench space without compromising cooling and pumping power. These Chillers offer space-saving design, high performance at low temperatures, simple installation, operation, and maintenance, and user-settable high and low temperature and low flow rate alarms.

VWR® General Purpose Water Baths: Versatile general purpose water baths feature large digital displays, programmable timers, programmable high limits, programmable calibration/temperature offsets, three programmable preset temperatures and audible alarms. Available in reservoir sizes ranging from 2 to 28 liters, these unstirred water baths have a temperature range of ambient +5° to 99°C and a stability of ±0.1°C.

Cryoprecipitate Bath • Viscosity Baths • Coliform Bath


Recirculating Chillers


Benchtop Chillers


Circulating Baths


General Purpose Water Baths

Blood Banks

A blood bank is a facility in which blood donation samples are gathered and stored/preserved. Some facilities also conduct testing to determine blood type and to reduce risks of problems during transfusion.

A Cryoprecipitate Bath can be used to thaw the blood for testing.

Recommendations:
Cryoprecipitate Bath (13272-290)

- Provides safe and reliable thawing of Fresh Frozen Plasma (FFP) for the recovery of Cryoprecipitated Antihemophlic Factor (AHF)
- The Cyroprecipitate Bath can thaw up to 24 units of FFP or Whole Blood (WB) simultaneously.

Blood Thawing

When Fresh Frozen Plasma (FFP) is thawed at the proper temperature (usually just above freezing, about 1° to 6°C) and rate, precipitate will form which is rich in fibrogen, factor VIII, von Willebrand factor, factor XIII, and fibronectin.

The Cyroprecipitate Bath provides the proper temperature and rate required.

Recommendations:
Cryoprecipitate Bath (13272-290)

- Provides safe and reliable thawing of Fresh Frozen Plasma (FFP) for the recovery of Cryoprecipitated Antihemophlic Factor (AHF)
- The Cyroprecipitate Bath can thaw up to 24 units of FFP or Whole Blood (WB) simultaneously.

Cell Culture

Cell cultures are used to develop vaccines, medicine, and other components of biotechnology research and to study viruses, bacteria, and other non-mammalian cells.

As changes in temperature will effect cell growth, our equipment can be used to maintain one temperature or to ramp from temperature to temperature to show the phenotypes resulting from the variations, depending on the specific procedure/research.

Recommendations:
VWR® Refrigerated Circulating Baths

Recommend: Advanced Programmable Controller
7L: 89202-974 (-20°C); 89202-892 (-40°C)
15L: 89202-990 (-30°C); 89202-998 (-40°C)
20L: 89203-006
28L: 89203-014
45L: 89203-022

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

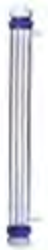
Cell Freezing

Recommendations:
VWR® Refrigerated Circulating Baths

Cell freezing also known as Cryopreservation, is a preservation technique where cell samples are frozen to sub-ambient temperatures to prevent biological activity, like reactions causing cell death. This allows the samples to stay viable until they are thawed for use.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Column Chromatography



Recommendations:
VWR® Circulating Baths or
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

- Size dependent
- Circulating baths come in refrigerated/heated, heat only, and open tank models
- Chillers offer choice of pump and compressor size

Column chromatography is generally used as a purification technique. It isolates desired compounds from a mixture. In the stationary phase, a solid absorbent is placed in a vertical glass column. In the mobile phase, a liquid is added to the top and flows down through the column by either gravity or external pressure.

Control and maintenance of column temperature throughout a series of analyses are important, yet frequently overlooked, parameters that can affect retention time reproducibility. Depending on column size, refrigerated circulators or chillers provide the cooling.

Bundling Options
For Chillers
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Culture Media Warming

Recommendations:
VWR® General Purpose Water Baths
or
VWR® Heated Circulating Baths

A culture media is an environment (perhaps a gel in a Petri dish) designed to enhance growth of different cultures (cells or microorganisms). Culture media temperature plays a big part in ensuring proper development of the culture. Constant temperature must be maintained at all times while warming or dissolving the medium during preparation for sample testing. Therefore a heated circulating bath can be used.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Distillation Apparatus

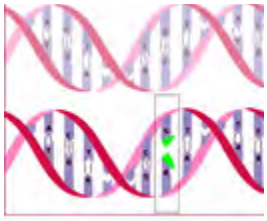
Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

Distillation is a technique for separating components of a mixture on the basis of differing boiling points. The mixture is heated, vaporizing some of the components. The vapor is collected and condensed to isolate the components with the lowest boiling points.

A chiller can be used to condense the vapors back into a purified liquid.

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

DNA Melting Curves



Recommendations:
VWR® Heated Circulating Bath

Recommend: 7L Heated with Advanced Digital Controller: **89202-926**

Note: Other reservoir sizes and controller types available.

For DNA, the melting point is the temperature at which 50% of DNA is denatured. Tertiary and secondary structures present in the native form are no longer present, revealing dissociation characteristics such as length, G-C content, and complementarity. To do this, DNA melting curve analysis can identify single-copy gene fragments amplified from genomic DNA.

A heated circulating bath can introduce the heat needed to begin the warming/melting process.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Dry Ice Replacement

Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

Dry ice is the solid form of Carbon Dioxide (CO_2) which occurs when deposition takes place. Deposition is when CO_2 changes from gas phase to solid phase which occurs when the temperature falls below -77°C. Dry ice is -77°C. In many cases, the end-user may not really need such a low temperature. It is used because it is relatively inexpensive, easy to purchase or even make, and completely non-toxic. Despite the benefits of dry ice, a cooler or chiller can be advantageous in the long run as it replaces the need to keep dry ice (or its components) on hand or continually purchase it.

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

E. coli Determination/Fecal Coliform Testing

Fecal coliform, found in the lower intestines of humans and other warm-blooded animals, is one type of coliform bacteria. The presence of fecal coliform in a water supply is a good indication that sewage has polluted the water. Testing to determine the potability of water can be done for fecal coliform specifically or for total coliform bacteria, which includes all coliform strains and may indicate fecal contamination.

Recommendations:
Coliform Bath (89202-922)
Specifically designed for the following Coliform tests:
• APHA, AWWA, WEF and EPA fecal coliform determinations at 44.5°C as specified in "*Standard Test Methods for the Examination of Water and Wastewater*" (19th edition). The membrane filter method or MPM method can be used.
• APHA, AWWA, WEF 7-hour Fecal Coliform Test at 41.5°C

Bundling Options
- polyclean ALGAECIDE (71002-500; 71002-502)

Electron Microscope

An electron microscope illuminates a sample and produces a magnified image utilizing an electron beam. The resolution of electron microscope magnifications is much better than with a traditional microscope, which allows better visibility of the specimen being examined. An electron microscope can magnify objects up 1 million times. A vacuum is maintained in the lamp housing where the electrons are speeded up until their wavelength is extremely short, only hundredth-thousand that of white light..

Chillers are often used to cool the vacuum pump. It is important that the vacuum pump is cool so that it doesn't shut down, resulting in the shut down of the electron microscope, and thus resulting in a potential loss of revenue.

Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

- Size dependent
- Choice of pump type and compressor size

Recommend: Turbine Pump
1/4HP: 97044-090
1/3HP: 97044-094
1/2HP: 97044-098
3/4HP: 97044-102
1HP: 97044-106

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Electrophoresis

Electrophoresis is the rate of movement of each component in a colloid suspension (gel) while under the influence of an electrical field. Substances, especially proteins, are separated and molecular size is analyzed. It is very important that the gel chamber is maintained at the proper operating temperature to ensure that heat energy from the electric current passing through the gel will not damage the gel. Therefore, refrigerated circulators can be used to cool the buffer within the chamber.

Recommendations:
VWR® Refrigerated Circulating Baths

Recommend: 7L models

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Enzyme Assays

Recommendations:
VWR® Refrigerated Circulating Baths

An assay is a chemical analysis achieved through an investigative or analytic procedure. In enzyme assays, enzyme activity is studied. Like many molecules, enzymes have an optimum temperature (sometimes related to the type of organisms) in which the enzymes are most active. For example, plants grow well near room temperature so their enzymes are most active at a temperature around 30° to 40°C.

A circulator is used to maintain the optimum temperature of a given enzyme sample.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

General Lab Cooling

Recommendations:
VWR® Refrigerated Circulating Baths

Advanced Digital:	Advanced Programmable:
7L (-20°C): 89202-970	7L (-20°C): 89202-974
7L (-40°C): 89202-978	7L (-40°C): 89202-982
7L (low-profile): 89202-962	15L (-30°C): 89202-990
15L (-30°C): 89202-986	15L (-40°C): 89202-998
15L (-40°C): 89202-994	20L: 89203-014
20L: 89203-002	28L: 89203-022
28L: 89203-010	

General lab cooling covers a variety of disciplines where samples must be maintained at a sub-ambient temperature. A refrigerated circulator will provide the necessary temperature level required to cool the sample.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

General Lab Heating

Recommendations:
VWR® General Purpose Water Baths
or
VWR® Heated Circulating Baths

General lab heating covers a variety of applications where samples must be heated, thawed or maintained at a temperature above ambient. In most applications, a General Purpose Water Bath will provide the temperature stability and range required. When more precise stabilities or higher temperatures are required, a Heated Circulating Bath can be used.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Incubation



Recommendations:
VWR® Refrigerated Circulating Baths or VWR® Benchtop Chillers

An incubator provides the ideal environment (temperature, humidity, CO2, etc.) for growing or maintaining a cell culture, or other living organisms. For most cell cultures, 37°C is optimal temperature and a heating recirculator or circulating bath provides this. The temperature is regulated through an incubation water jacket. In this process, the circulator or chiller regulates fluid temperature and circulates it through the water jacket, determining the temperature inside the incubator.
As incubation can also be done at lower temperatures in order to preserve the cell culture with allowing further growth, refrigeration may be helpful. Accurate temperature control and temperature traceability may also be required.

Bundling Options (for Circulating Baths)
- fluids, tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Bundling Options (for Chillers)
- base with locking casters (89200-794)
- tubing/insulation/hose clamps
- fluids

Isoelectric Focusing (IEF)


Recommendations:
VWR® Circulating Baths

An isoelectric point (pI) is the pH at which a particular molecule (for example, a protein) or surface carries no electrical charge. Because this point can be determined, and because proteins can carry both positive and negative charges, they can be separated. One method for this is isoelectric focusing, in which a pH gradient gel is used to separate proteins. This is also known as electrofocusing.

A circulator can be used to maintain the proper temperature of the gradient to ensure optimal, repeatable results.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Laser Cooling


Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

Light Amplification by Stimulated Emission of Radiation (LASER)
A laser is a device that emits highly amplified and coherent radiation of one or more discrete frequencies used for precision cutting, etching, and printing. In a medical environment, lasers are employed for a many applications. These lasers must have precise temperature control in order for the laser to work properly.

Chillers are used to reduce and control the internal temperature of the solid state components. Failure to remove heat from the laser can lead to the laser not meeting performance standards, or even worse, premature failure of the laser.

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Liquid Nitrogen Replacement

Liquid nitrogen is nitrogen that is liquefied at very low temperatures. The temperature of liquid nitrogen is -196°C (77K) and is a cryogenic fluid that causes rapid freezing on contact with living tissue. Liquid nitrogen can be used for many applications, primarily as an open-cycle refrigerant. In many cases, the end-user may not really need such a low temperature. It is used because of its availability. This is the case for cooling samples in analytical NMR. Alternatively, the convenience of a chiller can be an advantage over maintaining a liquid nitrogen supply on hand.

Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

- Size dependent
- Choice of pump type and compressor size

Recommend: Turbine Pump
1/4HP: 97044-090
1/3HP: 97044-094
1/2HP: 97044-098
3/4HP: 97044-102
1HP: 97044-106

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Liquid Temperature Control

Liquid temperature control is used in a wide array of applications utilized in laboratory and industrial settings. In general laboratory settings, control is required for tempering samples, warming culture media, etc.

Recommendations:
VWR® Circulating Baths

Recommend: Advanced Digital Controller
7L Refrigerated (-20°C): 89202-970
7L Refrigerated (-40°C): 89202-978

7L Heated: 89202-926

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Plasma Thawing

Plasma thawing results in cryoprecipitate when Fresh Frozen Plasma (FFP) is thawed slowly, at temperatures just above freezing. The result is an end-product rich in fibrinogen, factor VIII, von Willebrand factor, factor XIII, and fibronectin.

The Cryoprecipitate Bath provides the proper temperature and thaw rate required.

Recommendations:
Cryoprecipitate Bath (13272-290)

- Provides safe and reliable thawing of Fresh Frozen Plasma (FFP) for the recovery of Cryoprecipitated Antihemophlic Factor (AHF)
- The Cyroprecipitate Bath can thaw up to 24 units of FFP or Whole Blood (WB) simultaneously.

Reaction Vessel

Recommendations:
VWR® Refrigerated Recirculating (1/4 to 1HP) Chillers

A reaction vessel is normally a jacketed vessel of varying size (10 to 30 liters), used to contain the reactants in which a thermal reaction occurs. A Chiller is used to control the vessel temperature by circulating a fluid throughout the vessel's jacketed surface.

Bundling Options
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Refractometers

Recommendations:
VWR® Circulating Baths

A refractometer is an instrument used to measure the refractive index (R.I.) of a substance. All materials refract light (alter its angle). The amount by which light is refracted is an important feature of every medium. The measure of a material's refractivity is known as its refractive index or R.I. Temperature plays a very important role in refractive index measurement and needs must be both precise and highly controlled.

Substances with a known refractive index at a specific temperature are more readily identified by maintaining the sample at the correct temperature with a Circulator.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Rotary Evaporators

Recommendations:
VWR® Benchtop Chillers or Refrigerated Recirculating (1/4 to 1HP) Chillers

- Size dependent

Rotary evaporators (also called "rotovaps" in lab slang) are used to remove solvents from reaction mixtures and can accommodate volumes as large as three liters. While evaporation is possible without sample rotation, added benefits of rotary evaporators include bumping prevention and the formation of a thin film of warm solvent being spread over a large surface due to the centrifugal force and the frictional force between the wall of the rotating flask. The main components of a rotary evaporator are a vacuum system, consisting of a vacuum pump and a controller, a rotating evaporation flask, which can be heated in a heated fluid bath, and a water-cooled condenser with a condensate collecting flask. They are found in almost every organic laboratory. A chiller will help cool the vapor in the condenser, allowing faster collection of the components for further analysis or disposal.

Bundling Options
- base with locking casters (benchtop) (89200-794)
- external pressure reducer (PD or T pumps) (89200-796)
- external bypass (for MD pump chillers) (89200-798)
- RS232 retrofit kit (89200-800)
- tubing/insulation/hose clamps
- fluids

Spectrophotometer

Recommendations:
VWR® Circulating Baths

A spectrophotometer is an instrument used to measure the amount of light reflected from a specimen when illuminated by a controlled light source. This measurement generates a spectral curve (fingerprint) of a product, which can be used in the numerical identification and the calculation of color difference between samples. A circulating bath eliminates temperature variations while maintaining accuracy allowing for sample testing repeatability as needed.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Thawing Frozen Samples

Recommendations:
VWR® General Purpose Water Baths
or
VWR® Heated Circulating Baths

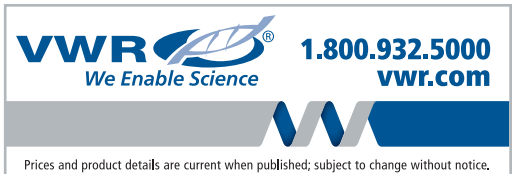
While the process is self-explanatory in that the sample is being defrosted, there are differing techniques when changing a sample from a frozen state. Many frozen products can be steeped in a warm heated circulator for rapid thaw, while other, more fragile products need to be brought to temperature slowly at temperatures at or below ambient, with a refrigerated circulating bath.

Bundling Options
- fluids
- tubing/insulation/hose clamps
- connectivity
  - RS232 cable, 9' (89201-010)
  - Ethernet cable, 9' (89201-012)
  - USB-A to mini-B cable, 9' (89201-016)

Viscosity Measurement

Recommendations:
VWR® Viscosity Baths
- available with five round openings (89202-902) or three square openings (89202-906, pictured)
- SD Controller, stability of ±0.04°C
- Unique configuration acommodates specific testing and quality control needs, including ASTM D-445.

Viscosity is a measure of a fluid's resistance to flow. It describes the internal friction of a moving fluid. A fluid with high viscosity resists motion; a fluid with low viscosity flows easily. Precise temperature control is paramount as is traceability to temperature standard. For example increases of only 5 to 10°C can double the viscosity of a lubricant. Good circulation and uniformity of the bath are critical.



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