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Connection with power supply

■Power plate seen at a glance

Check the voltage and current capacity before connecting.



■Quite dangerous when you mistake the outlet voltage!

If you connect a unit with 100V mistakenly to power supply 200V, excessive heat and burnout of wiring and parts are caused that are quite dangerous. When you realize the unit is connected to incorrect voltage, the unit should be inspected immediately.

■Is the ground connection securely?

Even with units equipped with a short circuit breaker, ELCB/ELB will not operate unless the ground connection is securely. Be sure to connect the ground securely as there is risk of electric shock when a problem occurs.



■Quite dangerous with looseness of power plug and outlet

Looseness between plug and outlet causes heat generation and voltage drop at the connection part that not only prevents the unit from operating properly, but also causes an accident such as fire (tracking phenomenon) caused by dust or moisture adhering to it. Please inspect it regularly cleaning the outlet and checking whether it is loosen.

■Pay close attention to operation of equipment

In particular, when continuous operation for a long time in Constant temperature water bath, be careful enough for the boil dry of heater due to the water level drop in the water tank. Check the water level regularly and replenish the bath water lost by evaporation.



Automatic water supply unit UB-2 (See page 118) is useful for replenishment of water baths in Thermominder series.

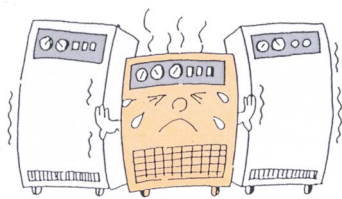
Suitable operating environment according to product types and usages.

■When use heat mediums other than tap water

When use pure water, oils, and heat mediums other than tap water with constant temperature bath or circulator, check whether the material of wetted parts compatible with these. It may corrode and lead to failure if not compatible.

■Installation environment

In particular Air-cooled type, do not place any object in front of the heat exhaust port or press it against a wall; otherwise the heat cannot be dissipated sufficiently and it may cause failure. Also, avoid using it in closed rooms, install in a well-ventilated place.



■Moisture and dust are great enemies

When dust accumulates inside the device, it may cause deterioration of the parts, wiring short circuit and electric leak. Also, do not pour water inside or put in foreign objects such as metal pieces.

■Regular cleaning is the key of long-lasting use

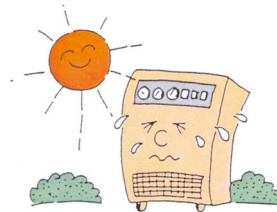
If you leave water stains and degraded oil alone, not only losing the fine appearance, but also causes failure and corrosion. Clean the filters regularly and wipe the dirt and moisture off each part if not use it for a long time, cover it to avoid dust and foreign object gets into it and store it a place with low humidity.

■Installation to a stable place

Be sure to install the equipment on horizontal floor or stand that can withstand the weight when operation. When the equipment with casters, lock them securely. Besides, clean the dust, water, oil etc. on floor surface regularly.

■Outdoor use strictly prohibited

Never use it exposed to direct sunlight or rain. Even when it installed indoors, avoid it from direct sunlight at the window etc. (except for Large CH series Separate-type outdoor unit and Integrated outdoor placement).



■Pay attention to Maximum load weight

If shakers etc. are operated with the max. load weight exceeded or with biased load, it may cause extreme wear, deterioration of parts or burnout of the motor.

Safety device and function

Our/TAITC products equipped with safety devices and functions according to their characteristics. The main safety devices have the following functions.

■Anti-freeze safety devise or Low temperature safety device

When the compressor used, freezing the surface of cooling pipes or the heat exchange tank may cause the refrigerator or circulator failed or the tank being burst. To prevent this freezing, the safety device being activated when using water as the heat medium and it cuts off the power of compressor with error displayed.

■Thermal protector (sample protection safety device)

Two upper temperature limits on the high temp. side and low temp. side can be set individually for protecting samples such as cultured microorganisms.

If the temp. in the storage or water tank rises significantly above the preset temp due to failure of the temp controller etc., the safety device at high temp. side is activated (so that the upper limit temp. set not exceeded). If similarly, the temp. drops significantly, the low temp. side is activated to cut off the compressor circuit.



■Over-current breaker

Activated to cut off the power supply when the rated current is exceeded due to the short circuit in electric circuit or overload to the motor etc. and the secondary parts breakage and accident are prevented.

■Others

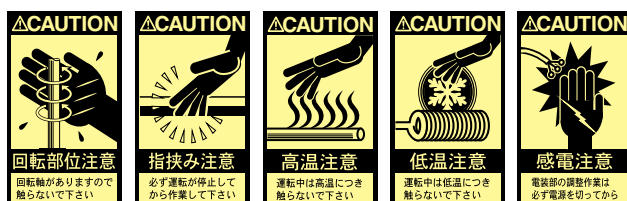
- Safety devices for compressor includes Overload safety, High/Low pressure safety, Thermal relay circuit etc.
- Shakers are equipped with Slow start function and Slow down circuit.
- The constant temperature baths are equipped with Self diagnosing function notifying errors, a water bath protection plate, etc.

Example of
High/Low pressure safety



■Safety sticker (Product Liability) on the product

The following stickers on the applicable part for safety use.

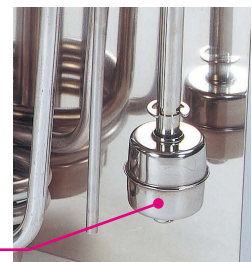


■High temperature safety device

Temp. fixed type that activates when the max temp. exceeded and cuts off the heating circuit. Prevents deterioration or damage of parts due to high temp. (automatic and manual recovery type available).

■Float type boil dry prevention safety device

Activated to prevent the boil dry before the water in the bath evaporates and the water level reaches the upper end of the heater' heating part. The heater not be reenergized if the water not replenished.



Float type safety device of
boil-dry prevention

■ELGB (Earth Leakage Circuit Breaker)

Cuts the power when the leakage current exceeds 15mA or 30mA to prevent electric shock accident. Also used as overcurrent breaker.



■Available various optional safety devices

We also can install various safety devices into the equipment according to your request as an option. If no mounting space of the safety device inside the main unit, it will be external one.

Various mountable safety devices (example)

- Overheat prevention safety device (manual recovery type)
- Earth Leakage Circuit Breaker (20A)

Selection guide

Constant temperature incubator shaker

CO₂ incubator shaker

Shaker

Mixer Rotator Stirrer

Bead beater homogenizer Ultrasonic homogenizer

Aluminum block bath Minimize bath

Water bath Shaking water bath Immersion cooler

Hybridization oven Constant temperature chamber

Centrifugal concentrator Cold trap

Freeze dryer

Electrophoresis and blotting apparatus

Constant temperature circulating water system (chiller)

Appendix

Heating medium for low temperature (Antifreeze) Show Brine Blue

Features

- Excellent long-term stable anti-corrosive effect.
- Prevent the growth of mold.

Usage

Set the concentration above the minimum concentration in the system. Be sure to verify concentration and pH are appropriate accordingly.

Check items	Reference values	Number of times
Concentration	30- 80%	One time/year
pH	8.0- 10.0	

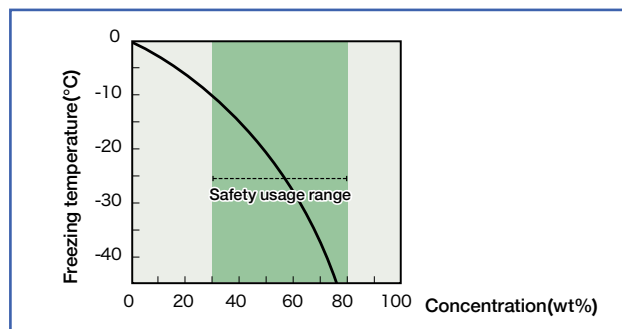
Precautions

When used at high concentration, it will apply a load on the pump highly.

Entrust disposal of containers and contents to a specialist disposal processor who is licensed by the government.

Classification	Hazards class	Symbols/ Pictograms	Signal	Hazardous information
Skin corrosive	3	No information	Warning	Skin irritation
Eye irritation	2B	No information	Warning	Causes eye irritation
Specification target internal organs/ systemic toxicity	3		Warning	May cause drowsiness and dizziness
Reproduction toxicity	1B		Danger	May damage fertility or the unborn child

Concentration-Freezing temperature Curve



Composition/Information on ingredients

Single Substance or Compound:Compound

Common chemical name :Ethylene glycol and Water

Composition and content :Ethylene glycol/approx. 75wt%, Boron Compound approx.1wt%, Water approx. 21wt%, various types of additives approx.3wt%

Common chemical name :CH₂OHCH₂OH, Na₂B₄O₇·10H₂O, Others undisclosed

CAS No. :Ethylene glycol 107-21-1, Boron Compound 1303-96-4

UN class :Not applicable

Industrial Safety and Health Law:Ethylene glycol- Target Substance

PRTR Target Substance :Ethylene glycol and Boron Compound: Class I Specified Chemical Substance

Safety and Self reaction

Flammability:The concentration rise by heating might catch fire.

Ignitability : (Spontaneous combustion, Reaction with water) No information

Oxidization :No information

Reactivity :Stable (from the information)

Others :No information

Fluorine-based heating medium for Low/High temperature GALDEN® HT series

Features

- Not subject to the regulations of Protection of the Ozone Layer.
- Explosion-proof measures NOT required with having no flash point.

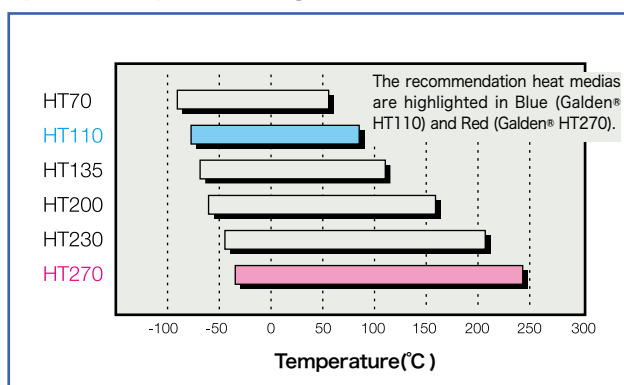
Usage

Use for a circulation to the closed circuit.

Precautions

- Not suitable for an open circuit as more volatile than other heat media.
- Not be used with water and oil type pump units (pump output required to increase 1.8-2.0 times when using water).

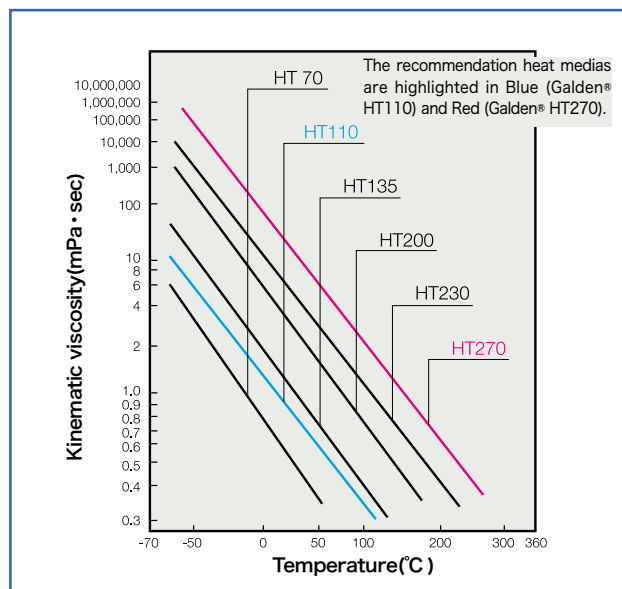
Operable temperature range



What can be used with Taitec's Chiller units and Circulators.

Heat exchanger/TEX-25A (p4) and Super cool/SC-60 (p29) using with Fluorine-based heat media (SC-60: Galden® HT110, TEX-25A: Galden® HT270).

Temperature-Viscosity characteristics



Heating medium for high temperature Silicone oil

Used in Wide temperature range

BARREL Silicone® MA series is a brownish translucent liquid improved heat resistance and oxidation resistance by taking an advantage of chemical inertness of silicone oil. This heating medium is extremely excellent in using with a semi-open system closed circuit for long time operation at high temperature.

We recommend the following when using it with our constant temperature water bath etc.

•BARREL Silicone® MA series MA-50

Can be used up to 230°C for a long time. Suitable for requiring a high accuracy temperature control.

•BARREL Silicone® MA-100

Can be used up to 230°C for a long time. Suitable for requiring a low evaporation weight loss.

Model		MA-50	MA-100
Appearance		Brownish translucent	Brownish translucent
Density	25kg/m ³ at 25°C	960	964
Specific heat	kJ/kg·K at 25°C	1.48	1.47
Thermal conductivity	W/m·K	0.151	0.155
Thermal expansion	1/°C	0.00104	0.00096
Evaporation	150°C, 24h, %	< 0.3	< 0.3
Flash point	°C	318	> 330
Kinematic viscosity	mm ² /s		
	25°C	50	100
	40°C	37	76
	100°C	15	31

Features

- Excellent Thermal and Oxidation stability.
- High flash point and Flame retardant.
- The working environment can be kept clean thanks to a very low vapor and a less evaporate loss.
- Excellent flowability thanks to a small change in viscosity by temperature and a low pour point.
- Odorless and Low toxicity.
- Chemically inactive.
- The time to replace can be checked by the appearance color change (degradation) of heating medium as a guide.

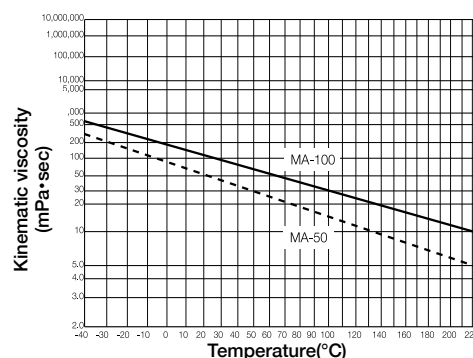
*The lifetime for the heating medium widely varies depending on the structure of used equipment and the usage conditions. At present, not a Standard for clearly determining to extent the unit be used continuously; However, we could examine that by comparing the properties of the heating medium in use with that of new one. In BARREL Silicone® MA series should be recommended being replaced when the quality changes as follows as a guide.

- 1, When the flash point drops more 20%.
- 2, When the viscosity at 40°C changes by more 20% .
- 3, When the appearance color changes to Colorless transparent or Black.

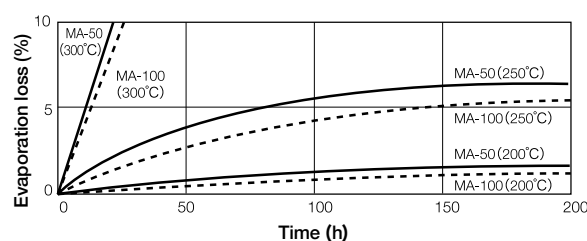
Precautions/Instructions

- When using the unit over 100°C or higher if there is moisture in the unit the water vapor will be explosively generated and the heating medium will be scattered.; Also, even if moisture enters while operating over 100°C the phenomenon will be the same. Hence, be careful not to get moisture contaminated.
- Make sure procure MSDS (Material Safety Data Sheet) and confirm the contents for safety.

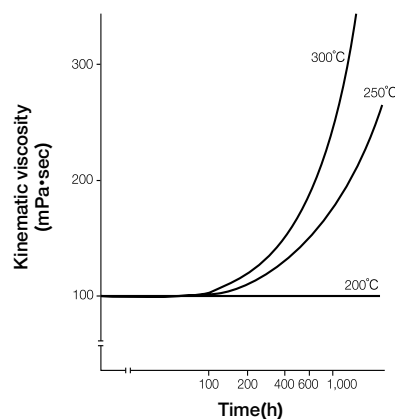
Temperature-Viscosity characteristics



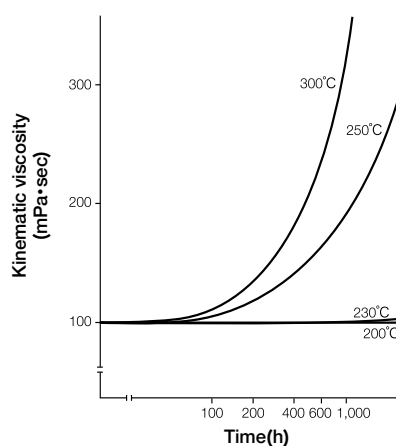
Relationship between evaporation loss and temperature



Change in viscosity of MA-50

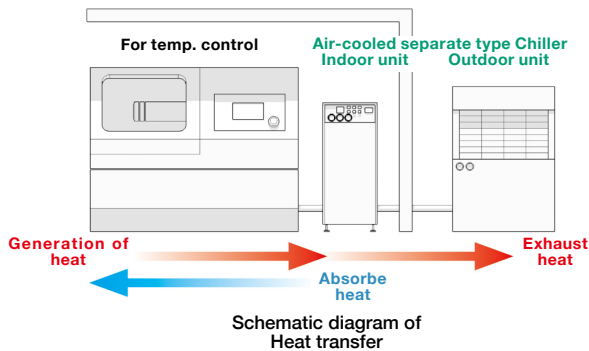


Change in viscosity of MA-100



How to Select Chiller unit

① Check approx. amount of circulating fluid



Chiller is a machine that removes heat from a fluid (heating medium) via a vapor-compression or absorption refrigeration cycle. (This catalog also introduces "Hot water Circulator" and "Heat Exchanger" that control the temperature by giving heat to the object).

When selecting a Chiller unit, the one criterion is "How much cooling the fluid temperature and how soon it cools". Firstly, check the capacities of "approx. the amount of circulation fluid" to Jacket tank and Water bath roughly.

At first, select a water bath capacity roughly because the water bath capacity varies depending on each model (Chiller unit) capacity. Required capacity for Chiller unit can be determined by the following calculating formula.

② Calculate required capacity for Chiller unit.

a. Calculating formula for a required capacity from Cooling time.

$$Q \text{ [kW]} = \frac{(T_2 - T_1) \times V \times \gamma \times C}{S} \div 0.86 \div 1000$$

T_1 : Temp. after Cooling[°C] γ : Density of Circulating fluid[kg/m³]
 T_2 : Temp. before Cooling[°C] C : Specific heat of Circulating fluid[kcal/kg°C]
 V : Circulating fluid amount[m³] S : Time for Cooling[h]

[Example]

Calculate required cooling capacity in the case cooling 10L (0.01m³) circulating fluid (tap water) from +20°C to +10°C in 1 hour.

Conditions (Density of Tap water: 1000kg/m³, Specific heat: 1kcal/kg°C)

$$Q = \frac{(20 - 10) \times 0.01 \times 1000 \times 1}{1} \div 0.86 \div 1000 \approx 0.116 \text{ [kW]}$$

b. Calculating formula for a required capacity from Circulating fluid temperature.

$$Q' \text{ [kW]} = (T_2 - T_1) \times V' \times 60 \times \gamma \times C \div 0.86 \div 1000$$

T_1 : Temp. after Cooling[°C] γ : Density of Circulating fluid[kg/m³]
 T_2 : Temp. before Cooling[°C] C : Specific heat of Circulating fluid[kcal/kg°C]
 V' : Amount of Circulating fluid[m³/min]

[Example]

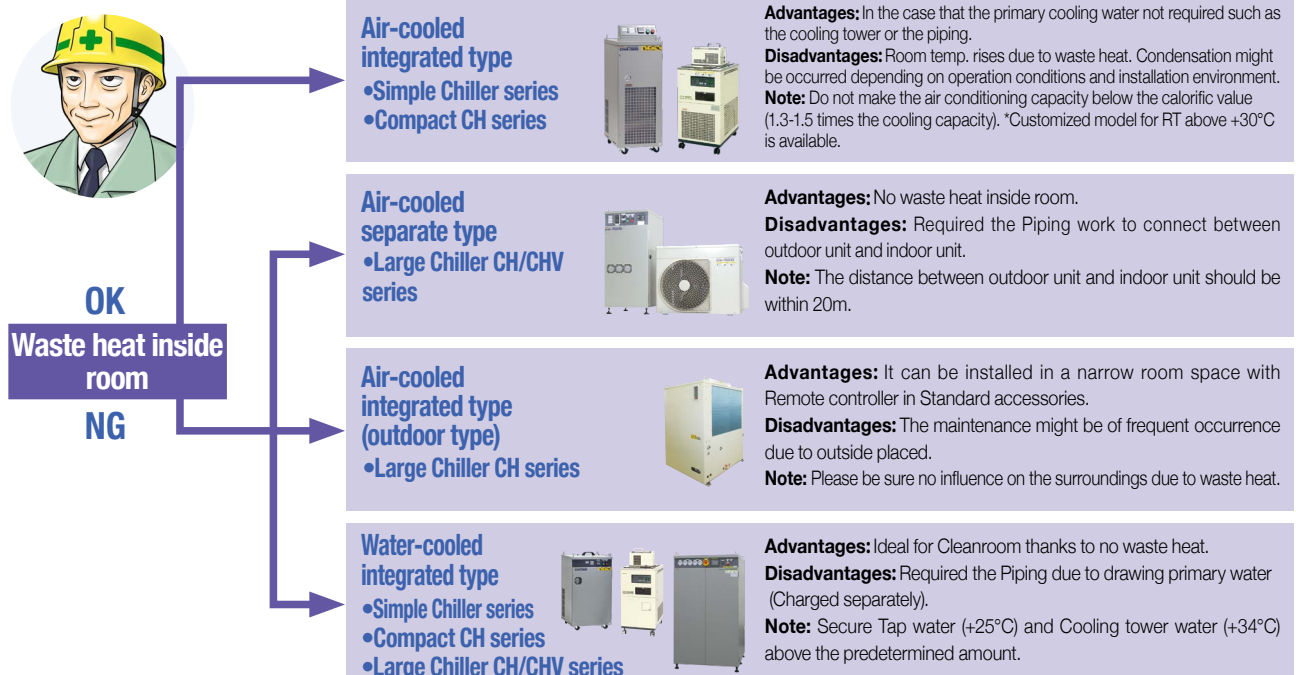
Calculate a required cooling capacity from the Heat load in which Circulating fluid (tap water) rate 6L/min (0.006m³/min), Returning fluid temperature +22°C, water Inlet fluid temperature +20°C.

Conditions (Density of Tap water: 1000kg/m³, Specific heat: 1kcal/kg°C)

$$Q = (22 - 20) \times 0.006 \times 60 \times 1000 \times 1 \div 0.86 \div 1000 \approx 0.837 \text{ [kW]}$$

*To select a model with cooling capacity 1.2-1.5 times the calculated value to secure a safety margin (for the fluid flow loss through piping) of the cooling efficiency.

③ Select suitable type for the installation environment.



Validation/ IQ (Installation Qualification) and OQ (Operational Qualification)

Recently, corporations such as pharmaceuticals and biotechnologies etc. widely require the validation in which whether the equipment used is correctly installed and operated in order to comply with various ministerial ordinances and standards to leave them as document records.

Just for your information: In order to support the validation work that requires time and equipment knowledge, only in domestically Japan, TAITEC has been actively conducting the following validation services by fully utilizing our accumulated knowledge on that.

■ The contents of TAITEC's main validation work.

Implementation items	Timing	Place	Contents
Installation Qualification (IQ)	At delivered At relocated	Usage place	Visual confirmation of product appearance and accessories Confirmation of usage environment (supply voltage, environmental temperature etc.) Confirmation of the stability and safety of installation place Confirmation of installation method
Operational Qualification (OQ)	At delivered At relocated Every fixed period	Usage place	Confirmation of electrical insulation and conduction Confirmation of the performance on temperature control (measurement). Confirmation of the performance on shaking speed (measurement)
Calibration before shipment	Before shipment	In-house (TAITEC)	The same as above IQ/OQ

■ IQ (Installation Qualification) and OQ (Operational Qualification)

The purpose of IQ is to confirm and record that equipment used for development and production processes is properly selected in just proportions and properly installed according to the purchase order form. The purpose of OQ is to confirm and record that the equipment used in the development and manufacturing processes has the designated performance functions under the specified environment. In OQ, the validation is performed by selecting test items and criteria from the specifications of device.

Selection
guideConstant
temperature
incubator shaker
CO₂-MonitorCO₂ incubator
shaker

Shaker

Mixer
Rotator
StirrerBead beater
homogenizer
Ultrasonic
homogenizerAluminum
block bath
Minimize bathWater bath
Shaking water bath
Immersion coolerHybridization oven
chamberCentrifugal
concentrator
Cold trap

Freeze dryer

Electrophoresis
and
Blotting apparatusConstant
temperature
water circulating
system [Chiller]

Appendix

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Selection guide

Constant temperature incubator shaker
CO₂ incubator shaker
CO₂ incubator shaker
CO₂ incubator shakerShaker
Shaker
Shaker
ShakerMixer
Mixer
Mixer
MixerRotator
Rotator
Rotator
RotatorBead beater
Bead beater
Bead beater
Bead beaterAluminum block bath
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Centrifugal concentratorFreeze dryer
Freeze dryer
Freeze dryer
Freeze dryerElectrophoresis and blotting apparatus
Electrophoresis and blotting apparatus
Electrophoresis and blotting apparatus
Electrophoresis and blotting apparatusConstant temperature water circulating system [Chiller]
Constant temperature water circulating system [Chiller]
Constant temperature water circulating system [Chiller]
Constant temperature water circulating system [Chiller]Appendix
Appendix
Appendix
Appendix

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Selection
guideConstant
temperature
incubator shaker
OD-MonitorCO₂ incubator
shaker

Shaker

Mixer
Rotator
StirrerBead beater
homogenizer
Ultrasonic
homogenizerAluminum
block bath
Minisize bathWater bath
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Immersion coolerHydriation oven
Constant temperature
chamberCentrifugal
concentrator
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Freeze dryer

Electrophoresis
and
blotting apparatusConstant
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water circulating
system [Chiller]

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