

Laser Chiller

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Tongwei Chiller is specialized in manufacturing [packaged chiller](#) and [portable chiller](#) to reduce the temperature of laser process.

Now, we have installed many chillers in laser machines cooling where our experience and expertise are meeting the needs of laser process around the world.

We can also custom design and manufacture laser water chillers to meet your specific needs.If you need a industrial laser chiller for a different laser process? **Contact Us**—we're here to help.



Laser Process

1.What is Laser Water Chiller ?

Laser chiller is a cooling machine based on cooling or refrigeration system in laser processing and laser processing used to adjust the optimal temperature and prevent laser wavelength deviation.

Laser water chillers for Carbon dioxide (CO₂) lasers, exciter lasers, ion lasers, solid-state lasers, and dye lasers.



Small Laser Chiller

2.Why Laser Process Need Industrial Laser Chiller?

The process of operating an industrial laser involves using an auxiliary gas (a mixture of nitrogen, carbon monoxide, and helium) to convert electrical energy into light with the same wavelength and phase. This process generates a large amount of heat, which can be harmful to manufacturing processes using laser beams. If thermal conditions are not properly regulated, heat-sensitive industrial processes will produce altered or poor quality products. An effective solution to contain the heat generated by laser use involves the use of specialized laser chiller to cool the manufacturing process.

3.How Laser Water Chiller Work

A typical industrial laser water chiller system is a circulating device that actively directs coolant between the process laser tube and the active refrigeration device, which is one of the basic components of laser equipment. Laser chiller manufacturers typically offer units with capacities ranging from 500 watts to several kilowatts.

Its working principle is to inject a certain amount of cooling water into the water injection hole of the laser water chiller.

Then the water is cooled into the cylinder through the refrigeration process of the laser chiller and works through the compressor. It turns into a gas with high pressure and temperature and enters the condenser.

The refrigerant gas exchanges heat with the cooling medium and cooling air, and transfers the heat to the outside of the laser chiller. Afterwards, the refrigerant gas solidifies into a high-pressure liquid.

The water from the laser water chiller is used to pump cooling water to the laser machine for cooling.

Now, the water cooled by the industrial laser chiller takes away the heat from the laser machine, the temperature rises, and then flows back into the water tank again, and then through the cooled water.

The laser cooler cools the cooling cycle to achieve the cooling effect.

4.What's the Difference Between Air-cooled & Water-cooled Laser Chillers?

There are two types of laser water chiller: one is **air-cooled laser chiller**, the other is **water-cooled laser chiller**;

Air-cooled laser chillers use ambient air to dissipate heat from the brewing processes. They are energy-efficient, space-saving, and less maintenance that helps save money.

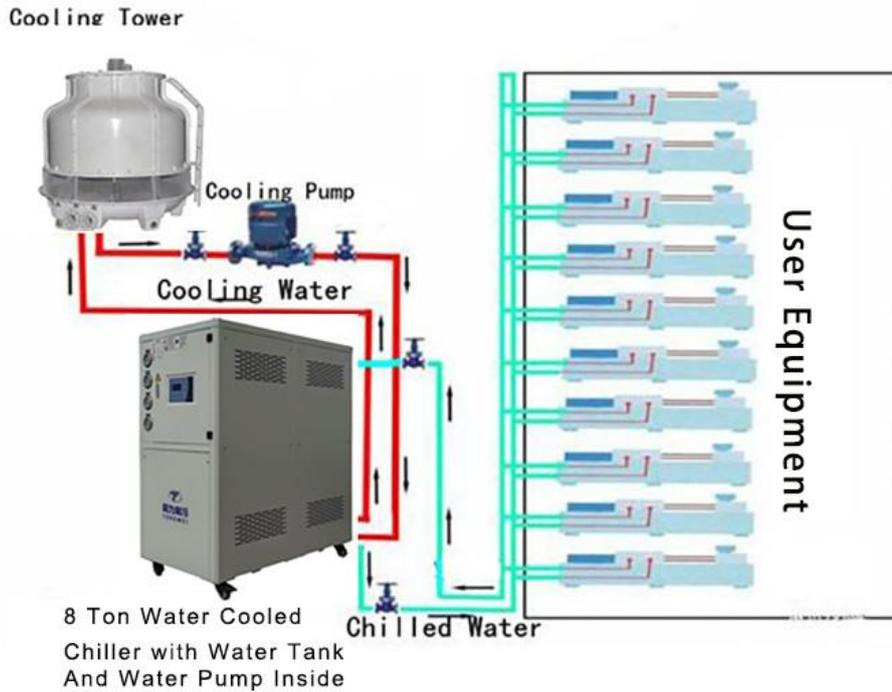
Water-cooled laser chillers use water from an external water cooling tower to dissipate heat from the brewing processes. These systems are longer lifespan, Relatively quiet, and more consistent cooling performance than the air-cooled laser chiller.

Air Cooled Chiller Installation Drawing



Air-cooled Laser Chiller Installation Drawing

Water Cooled Chiller Installation Drawing



Water-cooled Laser Chiller Installation Drawing

Should you choose an air-cooled or water-cooled laser chiller? Contact Us for help determining the best solution for you.

5.What Are The Main Components of Laser Chillers?

5.1 Compressor

The compressor is the key mover in laser water chiller because it produces pressure variations to stir the refrigerant around.

From 1/2HP(1/2 Ton) to 60HP(5oTon) laser chiller , which is with **Panasonic** or **Danfoss** brand **Scroll** compressor ,



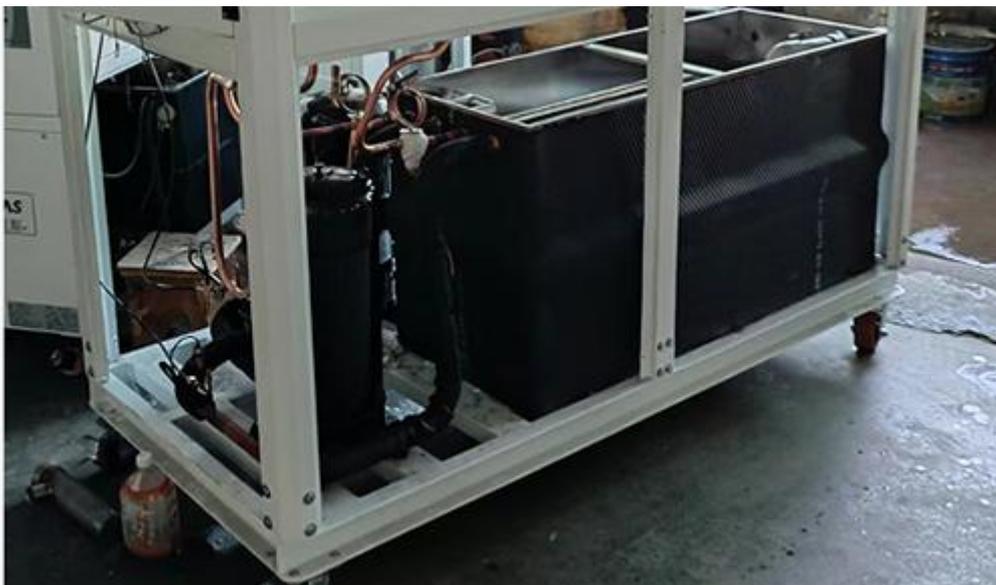
Panasonic Compressor

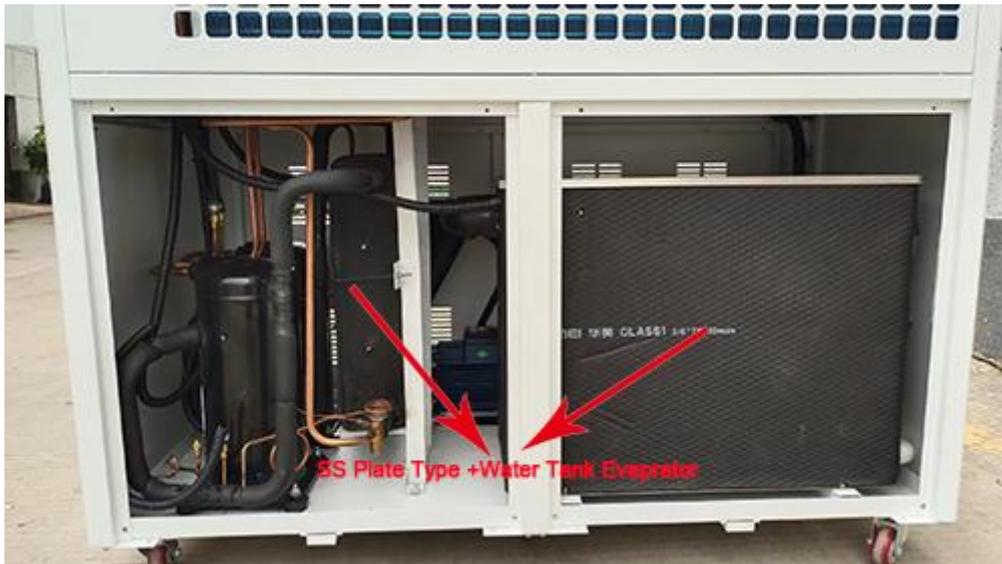


Danfoss Compressor

5.2 Evaporator

The evaporator is a crucial component of air-cooled laser water chiller, as it is responsible for extracting heat from the liquid being cooled, it is located between the compressor and the expansion valve. There are three types of evaporators : **coil in water tank evaporator** , **shell and tube evaporator**, **304SS stainless steel plate type evaporator**.





SS Plate Type+ Water Tank Evaporator



Shell and Tube Evaporator

5.3 Water Pump

The water pump is designed to increase the pressure and the flow of the chilled water in a closed space.



Water Pump



High Pressure Water Pump

5.4 Condenser

The condenser for air-cooled laser cooler is equipped with efficient cross-seam fins and female threaded copper tubes for high heat exchange efficiency and good stability. Its function is to cool down the refrigerant steam released from the compressor into a liquid or gas-liquid mixture.



Aluminum fin+fan Condenser for air -cooled brewery chiller

The condenser for water-cooled laser cooler is shell and tube ,with the internal copper tubes employing an outer thread embossing process. This design effectively enhances the heat exchange efficiency between the refrigerant and water during the process. Compared to traditional smooth copper tubes, the outer thread embossing process increases the surface area of the copper tubes, thereby expanding the contact area for heat exchange and improving the thermal conductivity of the condenser. This optimization design allows the condenser of the water-cooled chiller to transfer heat from the refrigerant to the water more rapidly and consistently, enabling the water to carry away the heat.



Shell and tube Condenser for water-cooled laser chiller

5.5 Controller Panel

Laser Water chillers use precision digital temperature controller, it RS485 communication port, which can do remote monitoring and control. Simple operation, low failure rate, high safety factor, easy installation.



Controller Panel

6. What are the Key Features of a Laser Chiller?

- Energy-efficient Panasonic/Danfoss compressor
- Water filters for water cleaning
- Chilled Outlet water temperature control 7°C to 25°C
- Precise temperature controller
- Environment-friendly refrigerant R407c/r410a
- PID temperature controller
- Easy installation ,operation and low cost of maintenance
- 304 Stainless Steel Coil in SS water tank as evaporator

7.What are the Applications of Industrial Laser Chiller?

Laser Chiller is right now utilized in industries for a wide range of processes including:

Drilling: The laser water chiller ensures more stable drilling, as well as ensures the stability of the drill rig and the pipe.

Laser chillers balance out the permafrost, allowing drilling into solid formations. Drilling without a laser water chiller reduces the stability of the rig and drilling tools.

The heat generated by drilling not only affects surface operations but also creates rough drilling conditions.

Welding: Utilizing a powerful fiber laser to weld two pieces of metal together, creating a strong connection between them.

Laser water chiller stabilizes the temperature of the fiber laser machine and improves the electrode tip, which increases the service life of the laser machine.

Poor temperature control of the welding rod will lead to early deterioration of the welding rod and reduce welding quality. It's always a plus point to use the appropriate laser chiller for your fiber laser application.

Cutting: Lasers are used to cut a range of different materials instead of traditional blades.

Due to the heat generated by the laser and the cutting itself, the temperature rises and deteriorates the beam quality, affecting the cutting.

A laser chiller can cool your laser head and laser source. By using a laser chiller, the laser can work properly in hot and cold conditions.

The laser chiller ensures that your laser cutting machine works normally at a constant temperature.

Perforating: In the food processing industry, lasers punch holes in packaging such as fruits and vegetables.

Since most of these packaging materials are plastic, it is difficult to keep the laser at normal operating temperature. Excessive heat can cause larger holes than normal, rendering your packaging unusable.

That's why laser chillers are designed to deliver superior performance.

Treatment: In the medical field, lasers are becoming doctors' right-hand assistants. From ophthalmology, dentistry, spine, plastic surgery to cancer treatments and treatments, lasers are with patients every day.

Because of their role, lasers need to stay cool and provide accurate and efficient performance.

>With the help of a laser water chiller, your laser beam will remain in the ideal position for any kind of surgery.

Whether you are in the manufacturing, food or medical industry. You need a laser chiller to get better results for your laser applications.



8.How to Choose Right Laser Chiller for Your Laser Process?

How to calculate right cooling capacity for your laser chillers?

One of the most frequently ask about how we can know the cooling capacity for chillers.

The range of a chiller at which it can discharge heat from a heated fluid is called cooling capacity.

The cooling capacity of a laser Chiller ranges from 1/2KW to 50KW.

Let's see the below formula.

Cooling Capacity(kw)= Flow Rate(m³/h)*Temp Change(T1-T2)/0.86

Heat Load= C(specific heat)* M(quantity output per hour)*Temp Change(T1-T2)

Oversize the chiller by 20% Ideal Size in KW = KW x 1.2

Noted : T1:Incoming Water Temperature (°C) T2:Required Chilled Water Temperature(°C)

For example, what size of chiller is required to cool 5m³ water from 25°C to 15 °c in 1 hour?

Temperature Differential = 25°C-15°C=10°C

Water Flow Rate = 5 m³/hour



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Cooling Capacity in KW = $5 \times 10 \div 0.86 = 58,14$ KW

Oversize the chiller = $58.14 \times 1.2 = 69.76$ KW

69.96kw cooling capacity for chiller is required.

Types of laserchiller system?

There are two types of chiller :**Air Cooled Laser Chiller** and **Water Cooled Laser Chiller**.

Water cooled chiller needs a separated water cooling tower and water cooling pump ,if you don't have exsiting water cooling tower,we suggest you use air cooled chiller; But if your ambiemt temperature is very high above 55°C ,we suggest you use water cooled chiller , as it is easier to dissipate heat for water cooled chiller with water cooling tower.

Whether chillers need built-in Tank or not?

In a chiller system, a tank is usually equipped to buffer the thermal load of the chiller.

But should we choose a built-in type of tank or an external type of tank?

A chiller with a built-in tank is easier to install and can be used simply by connecting a water pipe to your application.

But it has a limited capacity and is not suitable for applications with larger chilled water demands.External tank's capacity can be customized according to specific needs.

It can buffer a larger heat load, store more chilled water, but the installation will be more troublesome.

If you don't have external water tank ,we suggest our chiller built-with water tank ,which is easy for you to install.

Cooling capacity unit conversion?

1 KW=860 kcal/h ;

1 TON=3.517 KW;

1 KW=3412 Btu/h;

9.Contact Us to Learn More About Our Laser Water Chillers

We engineer and produce high-quality process chillers compatible with a broad range of industrial processes.

Depending on your needs, we also offer *custom chillers* to ensure that each client receives the

Phone: +86-15302636029

E-mail: info@cooling-chiller.com



Guangdong Tongwei Machinery Co.,Ltd. www.refrigerationchillers.com

industrial chiller best suited to their unique process.

Request a quote now on our laser water chillers or learn about the other *air-cooled chillers* and *water-cooled chillers* we offer.