SCANCOOL FREEZER WITH WATER COOLED CONDENSER

The following items will be discussed:

1. What is a condenser?
2. Why a water cooled condenser?
3. Working principal of the water cooled condenser?
4. Working principal of the water cooled condenser in the SNIJDERS freezer?

1. WHAT IS A CONDENSER?

A condenser is used in a cooling system. It removes the heath coming from a refrigerant , which flows through the condenser. When this refrigerant flows through the condenser it cools down and condensates. In other words: it transforms from gas into a liquid phase.
Heat from the condenser removes through air or water. That's why condensers are normally air- or water cooled. An air cooled condenser is fitted with a ventilator while the water cooled condenser operates with a pump and cooled water.

Below we present the water cooled condenser.
The refrigerant is cooled in the condenser while the heat removes through the water. The feasible condensation temperature depends on the temperature of the water. It's possible to use water from the tap, well, surface or cooling tower.
The condensation temperature is normally regulated by varying the quantity of the water flow.

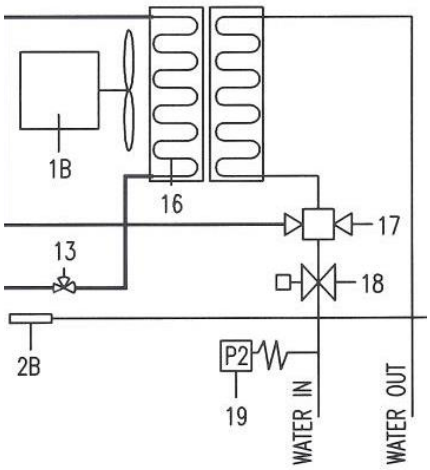
The energy consumption of a water cooled condenser mainly consists out of electric energy , powering the central pump of the cooling water.

2. WHY A WATER COOLED CONDENSER?

The difference in pressure between the evaporator [1] and the condenser influences the energy consumption of the cooling system. It's therefore important that the cooling system operates with the lowest possible condenser pressure. This can be achieved by applicating a water cooled condenser instead of an air cooled one.
Take care that sufficient water with the correct temperature of +14°C - +16°C is used.

The temperature of tap water is perfect to use for the water cooled condenser. It's advisable to re-use the cooled water for the cooling of the water cooled condenser.

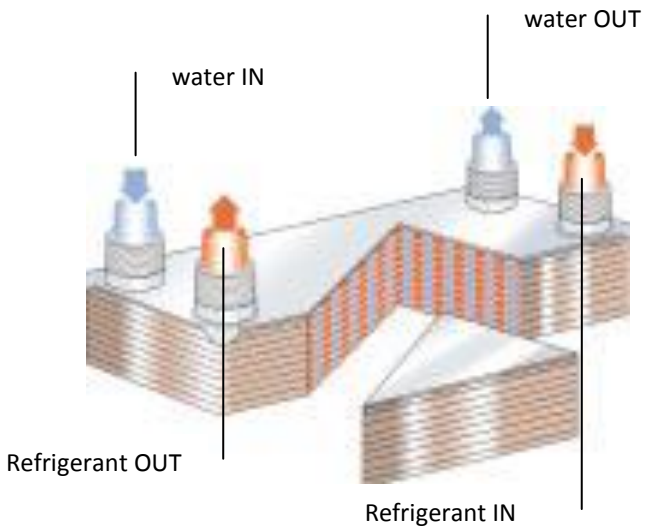
[1] An **evaporator** is an exchanger in which liquid evaporates. The purpose of an evaporator is to collect the thermal energy to use it elsewhere.



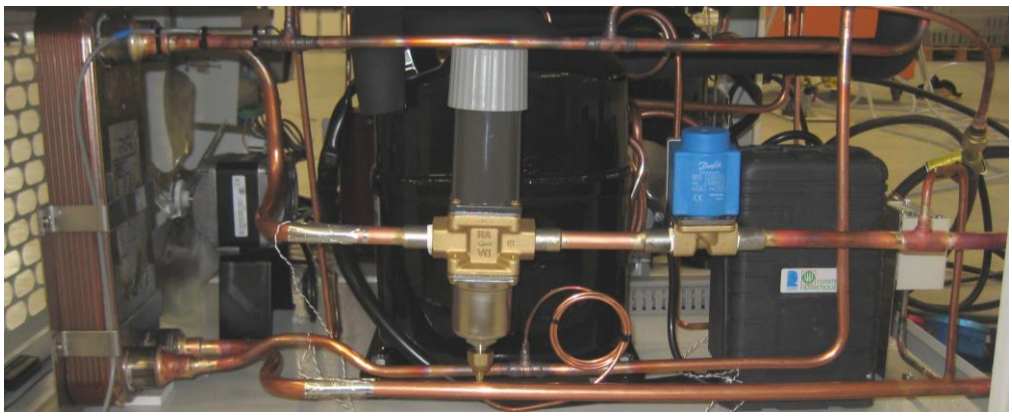
Cooltechnical pattern of a SCANCOOL freezer incl. water cooled condenser.

3. WORKING PRINCIPAL OF THE WATER COOLED CONDENSER

The heat transferring surface consists out of profiled sheet, stacked on each other, forming a canal system that way. The refrigerant and water are being brought into a turbulent flow by the profiled sheet. This results into a very high heat transfer and a self-cleaning effect. High pressures and high temperatures are possible because the sheet has been soldered with copper under vacuum at all tangent points.

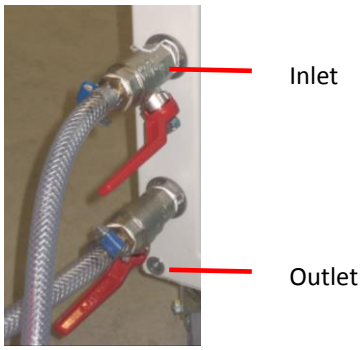


4. WORKING PRINCIPAL OF THE WATER COOLED CONDENSOR SYSTEM IN THE SCANCOOL FREEZER

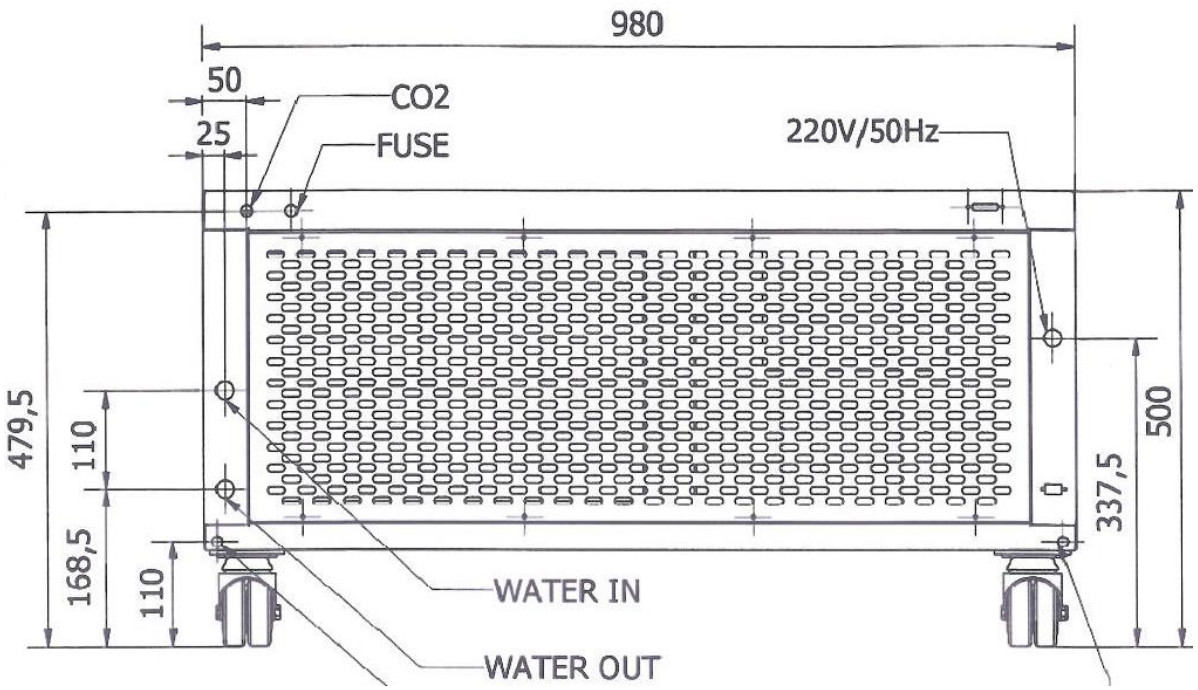


Water cooled condenser system SCANCOOL freezer

Pressostat (2)



Water in- and outlet (1)



(4) backside of the freezer, type SCL610P, connections for watercooling, connection to CO_2 back-up cooling system

Explanation (see page 2):

At the back of the freezer (4) you can find the connections for the water inlet and the water outlet (1). The water comes in through the water inlet and flows out through the water outlet.
When cooling is required the PT1000 sensor (temperature sensor which shows the display value) gives a signal to an electronic control, which activates the cooling system. This system also switches a water valve in, which is connected to the water inlet.
The water (approx. +15°C) flows through the water pressure valve to the water cooled condenser.

The water flows in the opposite direction from the refrigerant through the condenser (see next chapter 3 & the schematically drawing below) to leave it again through the bottom of the condenser.
This out flowing water is warmer than the in flowing water. This water is heated by the refrigerant which already flows into the condenser in gas phase and changes into the liquid phase (phase change). This means that the cooling inside the freezer occurs by the water which cools the refrigerant.

This water condenser system of SCANCOOL is secured by means of a pressure pressostat (2). When there is no water pressure available, the cooling system of the freezer won't be switched on. This results into an increasing temperature.

Schematically drawing: