

Basic knowledge

# Main elements of a compression refrigeration system

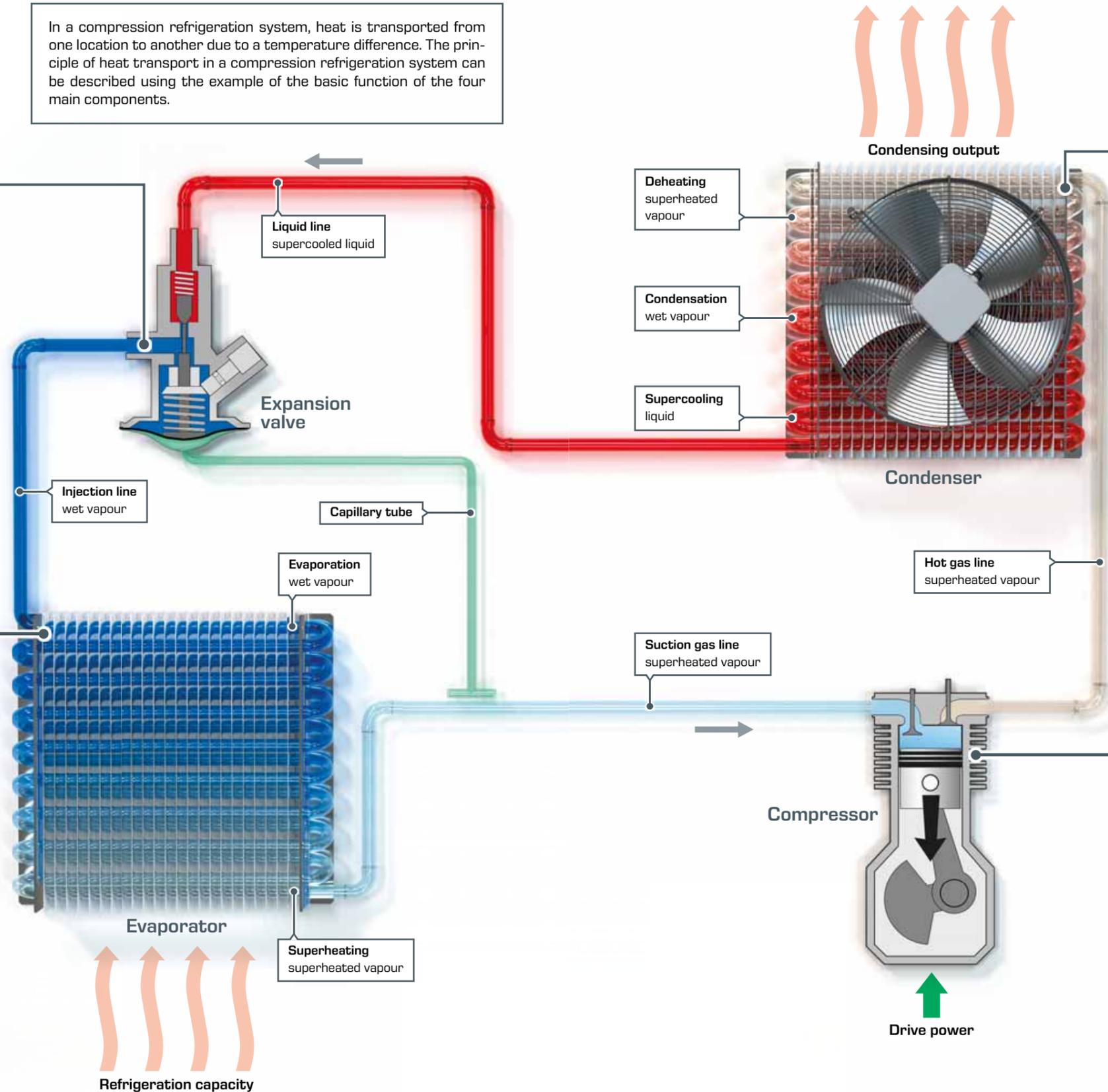
In a compression refrigeration system, heat is transported from one location to another due to a temperature difference. The principle of heat transport in a compression refrigeration system can be described using the example of the basic function of the four main components.



The **expansion valve** is located between the condenser and the evaporator. Its task is to expand the pressurised refrigerant. The expansion to a low pressure is necessary so that the refrigerant can evaporate again at low temperatures. A portion of the refrigerant evaporates due to the pressure reduction at the expansion valve, which results in a drop in temperature. In addition, the superheating of the refrigerant in the evaporator can be achieved by using the expansion valve. The superheating ensures complete evaporation of the refrigerant.



In the **evaporator**, heat is extracted from the environment or a fluid and transferred to the refrigerant. The refrigerant evaporates during this process. In this case, the useful side is located in a refrigeration plant. The temperature of the refrigerant remains constant during evaporation despite absorbing heat. The absorbed energy is used for the phase change. In order for evaporation to be able to take place, the temperature of the liquid refrigerant must be lower than the fluid being cooled. This required evaporation temperature is directly proportional to the pressure which is specifically achieved by the suction effect of the compressor and the contraction of the expansion valve.



In the **condenser**, the heat is released from the refrigerant and transferred to the environment. The refrigerant vapour condenses due to heat dissipation. The refrigerant vapour must have a higher temperature than the environment. This required condensing temperature is directly proportional to the pressure generated by the compressor. Condensation takes place at constant high pressure.



The **compressor** is the drive unit of a compression refrigeration system. It extracts the gaseous refrigerant from the evaporator, increases the pressure of the refrigerant vapour and conveys the gaseous refrigerant into the condenser. The compressor must raise the pressure of the refrigerant vapour to a sufficiently high pressure level so that the refrigerant can condense in the condenser by releasing heat.