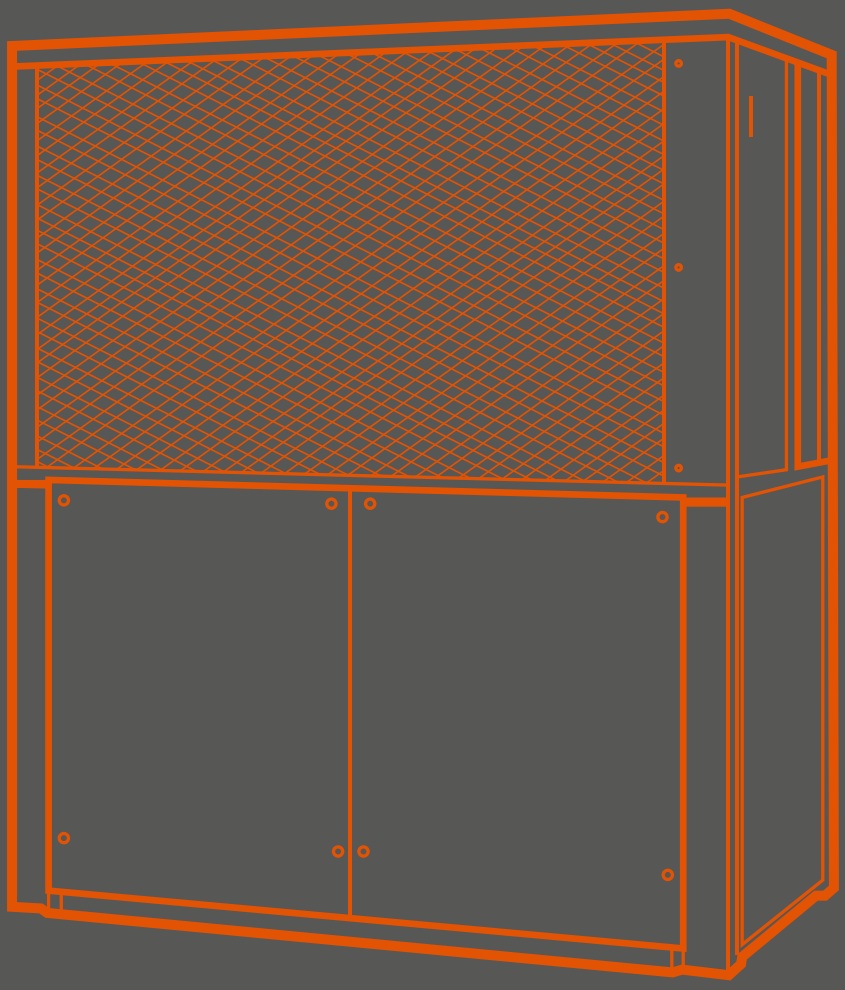
Schwank
Heating. Cooling. Systems.



Electric Heat Pumps

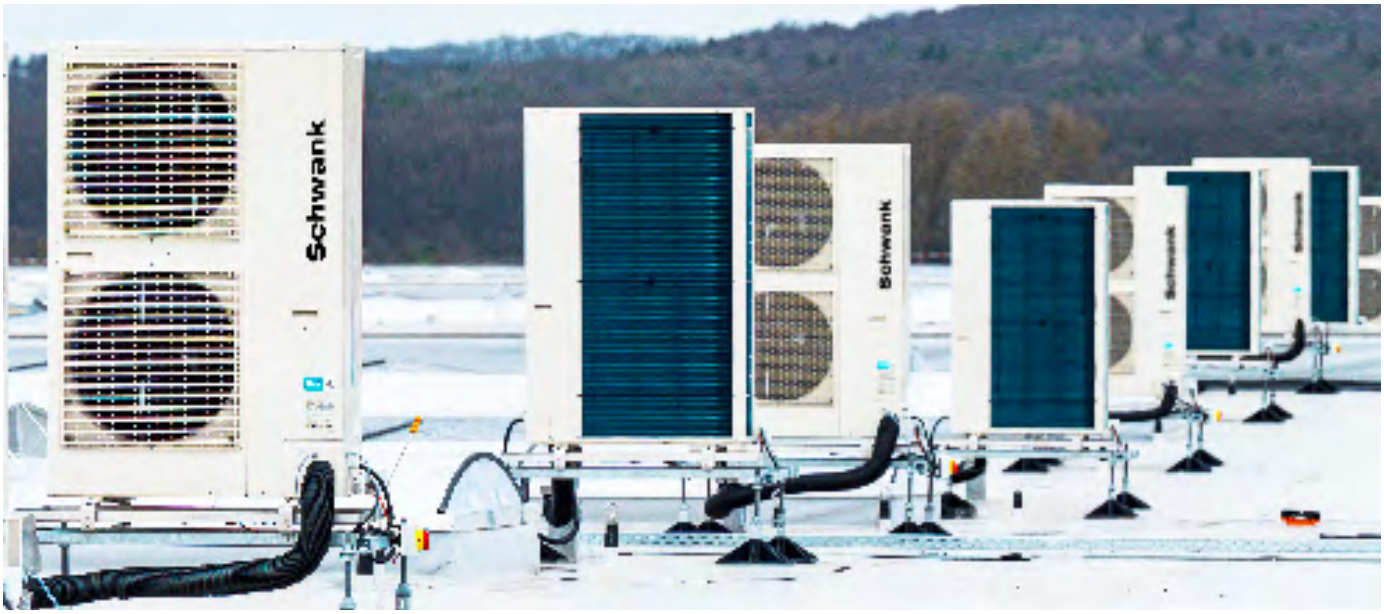
Industry | Commerce | Logistics

As a multinational family business, Schwank offers customised, complete solutions for commercial and industrial HVAC applications. For 90 years we have been a renowned leader of energy efficient solutions.

Heat pumps - cooling and heating with one system

Using renewable energies - reaching carbon neutrality

Heat pumps are among the best solutions for environmentally friendly heating and cooling. In view of carbon net zero goals and rising energy prices, heat pumps offer an option to replace the existing heating system with an efficient and economical solution.
Heat pumps draw around three-quarters of the energy for heating from the environment. This energy is available at no cost.



Function and efficiency

All heat pump systems, share the same basic function: it is the refrigeration principle, only in reverse. In contrast to a refrigerator which withdraws heat from the inside, the heat pump obtains the heat from the outside. By reversing this principle, the building can also be cooled.

Even at freezing temperatures, the heat pump can produce heat. For conventional refrigerants, this is between -57 °C and -12 °C. Thus, even cold winter air still provides enough heat energy to heat buildings economically.

Air-to-Water versus Air-to-Air - what is the difference?

Air to air heat pumps (also known as air source heat pumps or ASHPs) extract heat from the outside air and transfer it directly to the indoor air. They can be used for both heating and cooling purposes, as they can reverse their operating cycle. The heat is distributed via a network of ducts, similar to a traditional forced-air heating system or air conditioning unit.

On the other hand, air to water heat pumps (also known as air source heat pumps with hydronic or water-based distribution systems) extract heat from the outside air and transfer it to a water-based heating system. They are primarily designed for heating applications and are usually connected to radiators, underfloor heating systems, or a hydronic fan coil unit.

Air-to-Water Heat Pumps

Flexible and economical

Due to the very good value-, air-to-water heat pumps are among the most frequently used heat pump systems in new construction projects. Air-to-water heat pumps make use of free ambient heat to efficiently generate hot or cold water. With one incredible benefit: the heat can be taken from the environment everywhere and in infinite quantities. It is even possible to cover heating requirements with only low flow temperatures between 35 - 40 °C. In this range, heat pumps are particularly efficient.

For poorly insulated buildings, requiring higher flow temperatures, there are suitable solutions with higher temperatures.

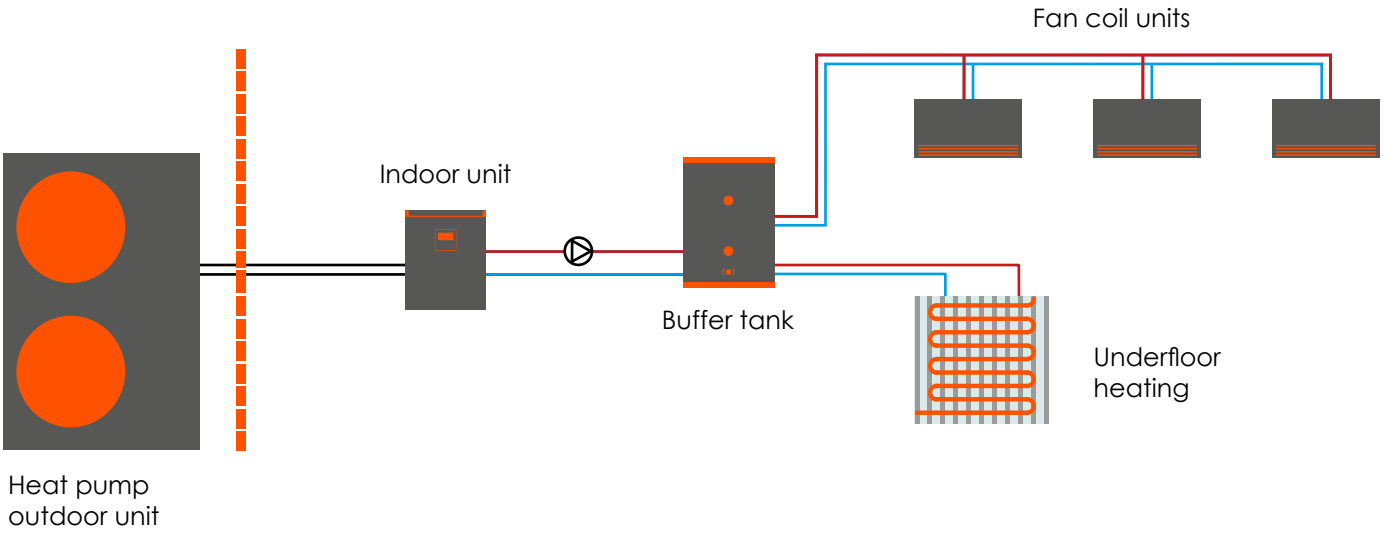
To ensure economical and long-lasting operation and good control behaviour in heating and, if necessary, cooling operation, buffer storage tanks are used. The number and size, as well as the choice of the heat distribution, are designed specifically for the project on the basis of the future profile of requirements. (for possible options see below)

Areas of application:

- Commercial and industrial buildings
- New construction and refurbishment
- Outputs from 6 - 400 kW, modular design
- Higher flow temperatures up to 55 °C

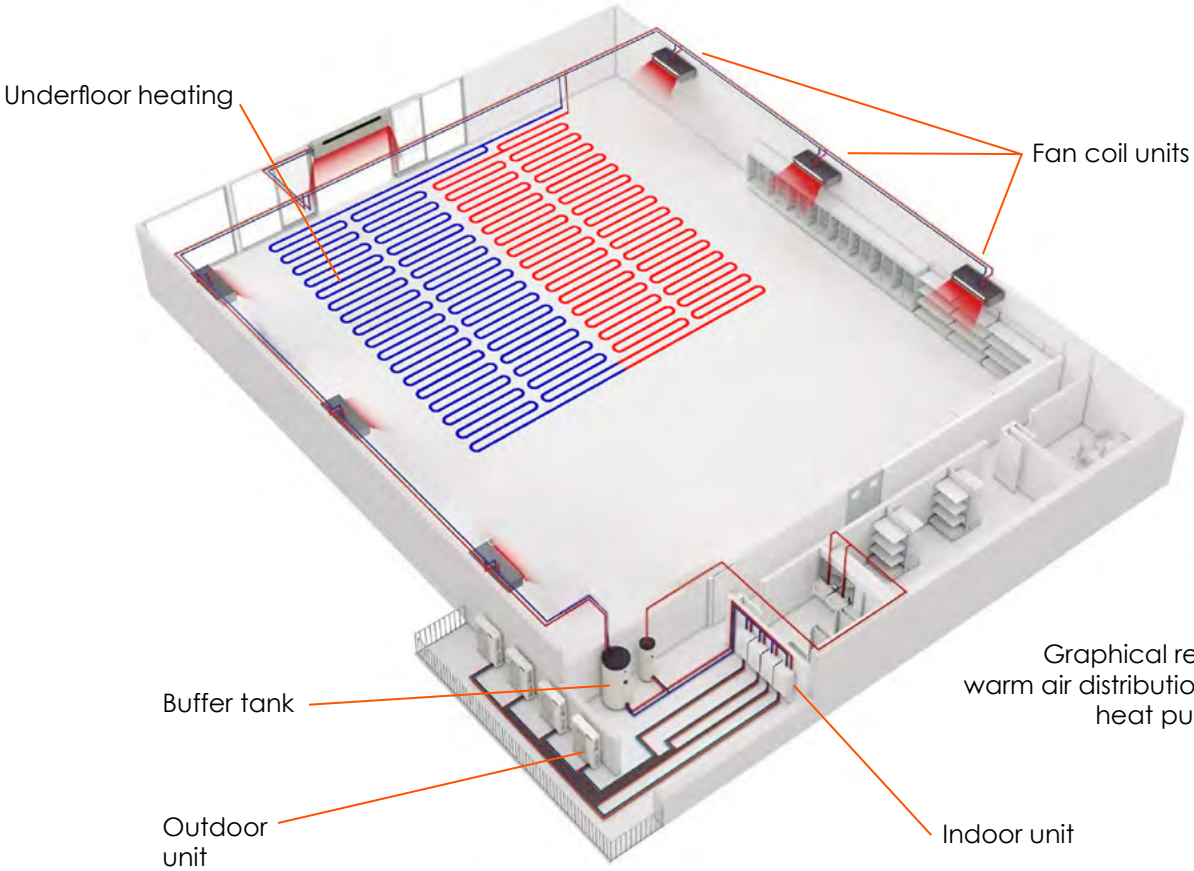
Heat distribution options:

- Static heaters / radiators
- Underfloor/industrial panel heating
- Concrete core activation
- Radiant ceiling panels
- Air handling units
- Fan coil units

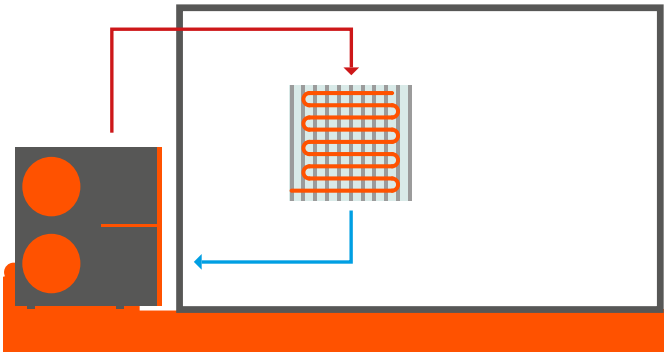


Advantages:

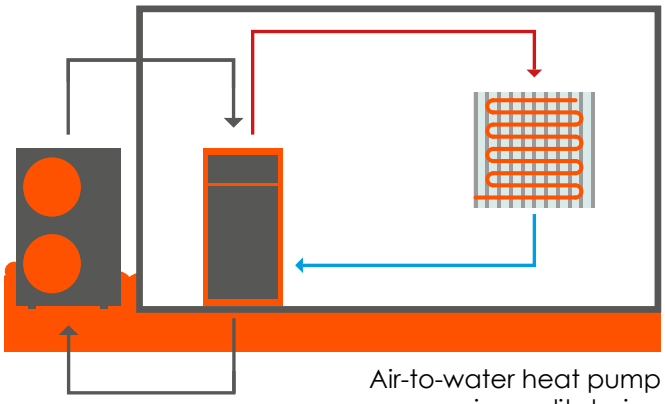
- In comparison to brine to water heat pumps, low investment costs
- Low space requirement inside and outside the building
- Environmentally friendly
- Easy implementation of corporate climate targets with future-proof R32 refrigerant or natural refrigerant R290
- Replacement of fossil fuel boiler by connecting it to the water-based heating system
- Low refrigerant quantity due to a water-based heat distribution system
- Cooling mode with little additional effort feasible



Graphical representation of the warm air distribution of an air-to-water heat pump with buffer tank



Air-to-water heat pump in a monobloc construction



Air-to-water heat pump in a split design

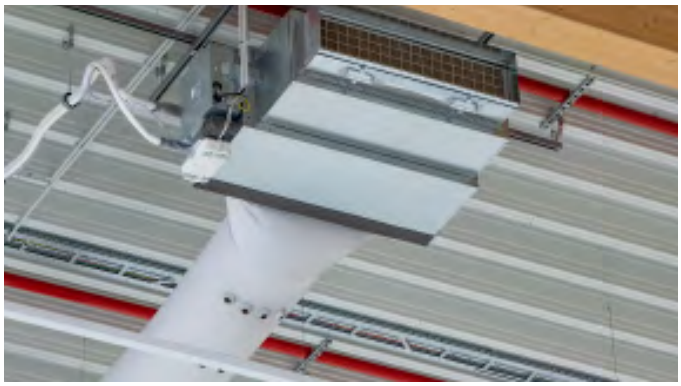
Air-to-Air Heat Pumps

Uniform temperature distribution with single/multisplit systems

Air-to-air heat pumps are a flexible solution to heat industrial buildings inexpensively and efficiently.

Air-to-air heat pumps can also work as an air conditioning system. With reversal of the thermodynamic process in the heat pump, it can extract heat from the building and thus cool it. The inverter-controlled heat pump systems can be mounted decentrally on the outside of the building.
Connected by refrigerant lines, an indoor unit distributes the warm or cold air into the building. This keeps installation distances short, heat / cold losses low, and the hot/cold air can be established in a controlled manner.

A wide range of air distribution systems allows bespoke custom solutions to be designed for a wide variety of building types and uses.
Since the heat pumps require only small amounts of refrigerant, maintenance costs remain low and inexpensive.



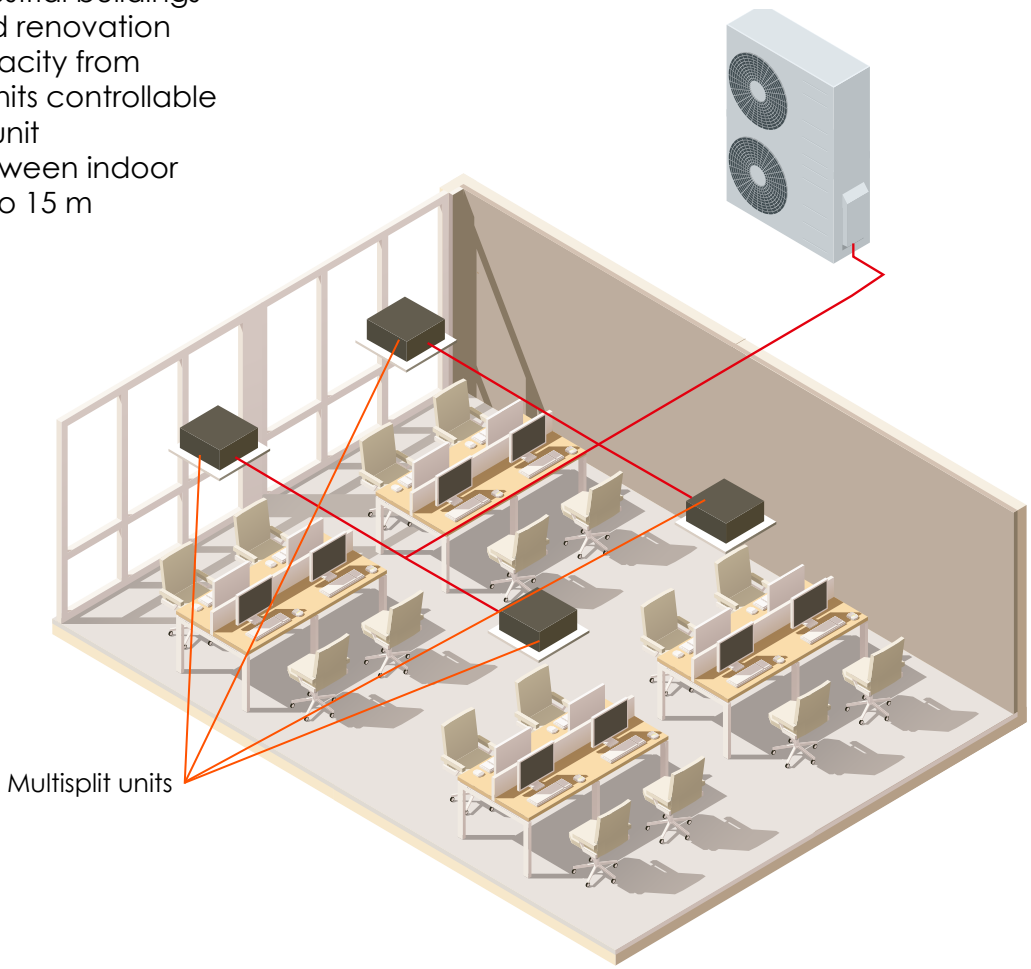
Indoor duct unit with textile air duct

Did you know?

For each kW of electricity consumed by a heat pump, about 4kW of thermal energy is generated, this corresponds to around 300% efficiency!

Areas of application:

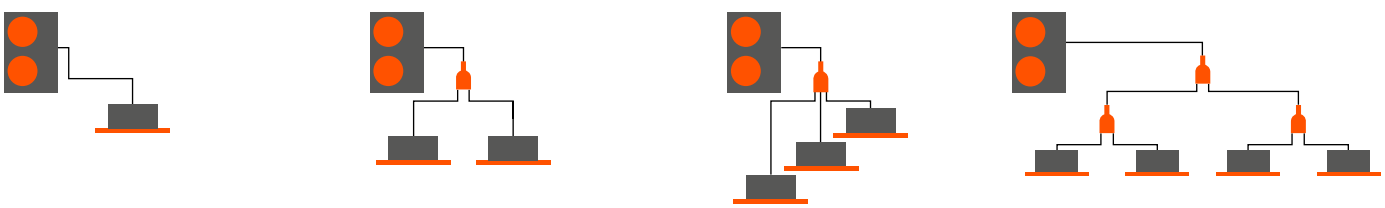
- Commercial and industrial buildings
- New construction and renovation
- Nominal heating capacity from 4 - 28 kW, up to 128 units controllable via a central control unit
- Height difference between indoor and outdoor unit up to 15 m



Graphical representation of a multisplit system

Advantages:

- No hydraulics, reduced installation in the building required - thus low investment costs
- Flexible and compact: cooling operation can be implemented with little additional expenditure
- Low weight: places only a minor burden on structual loadings
- Environmentally friendly: easy implementation of corporate climate targets with the refrigerant R32
- High reliability due to multiple, independent units



Example: setup of single, dual, trio and quattro systems

Heating and Cooling with Air

The suitable air distribution

For a good climate and temperature distribution, the air distribution system is critical. The depth of penetration of the warm air into the specified heating zones is of particular importance. This can be achieved by taking important information about the building into consideration, such as: the height of the room, the required heating capacity, the demand for temperature uniformity, and the type of building. These aspects will decide the selection and design of the system.

HVLS big fans / MonsterFans

HVLS fans distribute large volumes of air at very slow speeds and at very low operation costs. Destratification with HVLS fans is the key to evenly distribute heat or cold uniformly in the building.

A MonsterFan circulating air for proper temperature distribution

Textile air distribution

Textile air ducts not only differ visually from metal air duct systems, but also have clear advantages. The first and foremost advantage is their low investment cost. Unlike metal air ducts, textile air ducts do not need to be assembled from expensive components and can be cut to size for individual layouts. Due to their low weight, the limited roof load is not subject to additional stress. In addition, textile air ducts can be easily installed, disassembled and cleaned. The textile ducts can be equipped with perforations or nozzles in various dimensions and arrangements.

Textile air distribution

Advantages:

- Significantly lower investment costs than metal air duct systems
- Low weight
- Very hygienic, easy cleaning or replacing
- High penetration depth, also for large buildings >10 metre height
- Sound-reducing material
- Draught-free air introduction via perforations or nozzles
- Reduces operating costs due to low pressure losses
- Flexible installation
- Colours selectable

Air outlet with jet nozzles

Jet nozzle / long throw grille

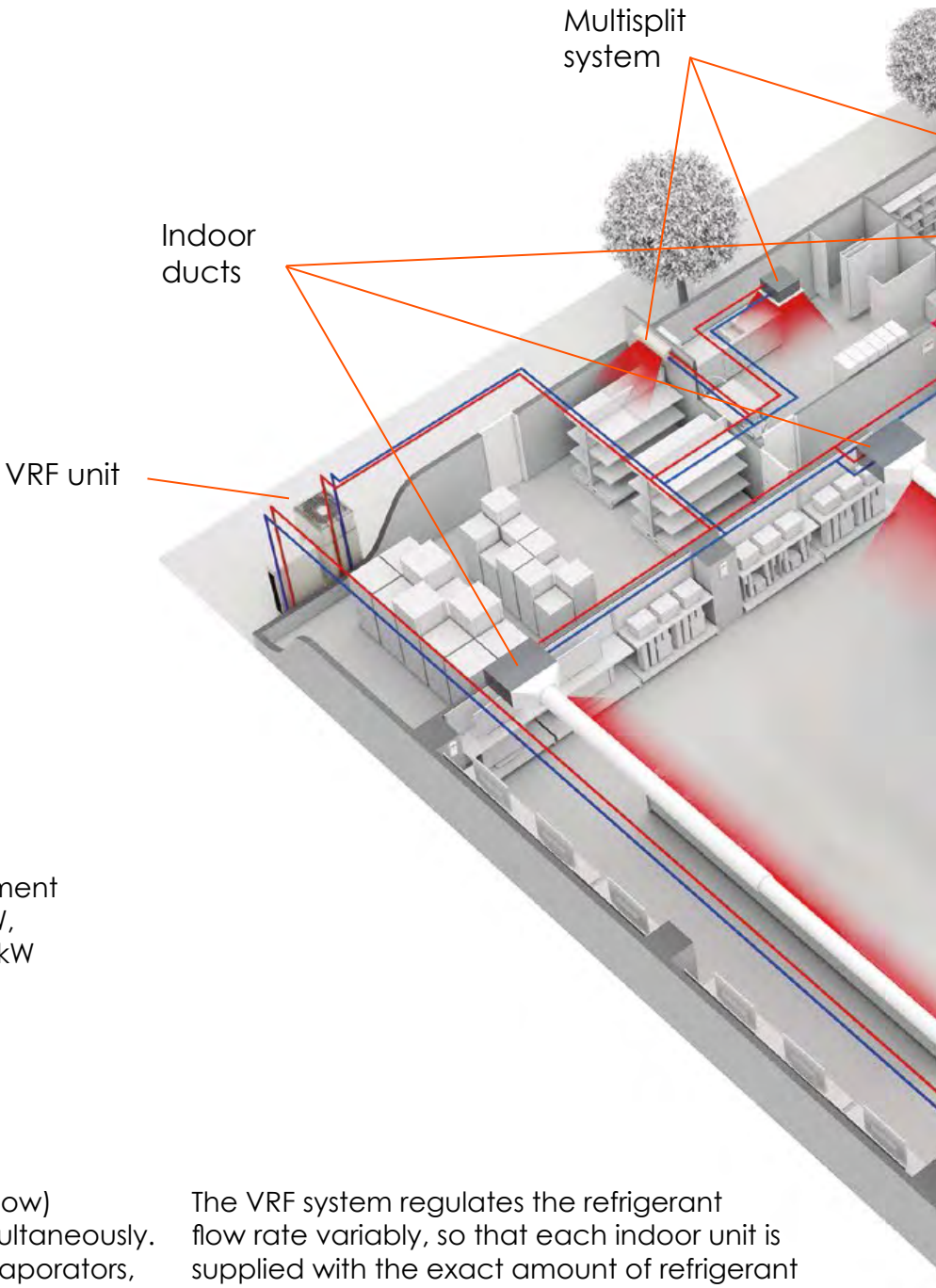
Long-throw nozzles and long-throw grilles are characterised, by their compact design and are suitable for tall buildings. They can blow out high air volumes over long distances. The nozzles of the discharge heads can be adjusted individually, meaning that all angles or directions in the building can be targeted. The use of jet nozzles and long throw grilles reduces the installation effort and thus lowers the investment costs.

Advantages:

- Extremely compact
- High air volumes and outputs reduce installation effort
- Low maintenance requirements
- Variable: jet angle and direction individually adjustable
- Low investment costs

VRF Systems

Flexible heating and cooling of multiple spaces



Areas of application:

- Several rooms or units within a building:
  - Office and meeting rooms
  - Storage areas
  - Production facilities
- New construction and refurbishment
- Power ranges from 12 kW to 50 kW, cascading design up to over 200 kW

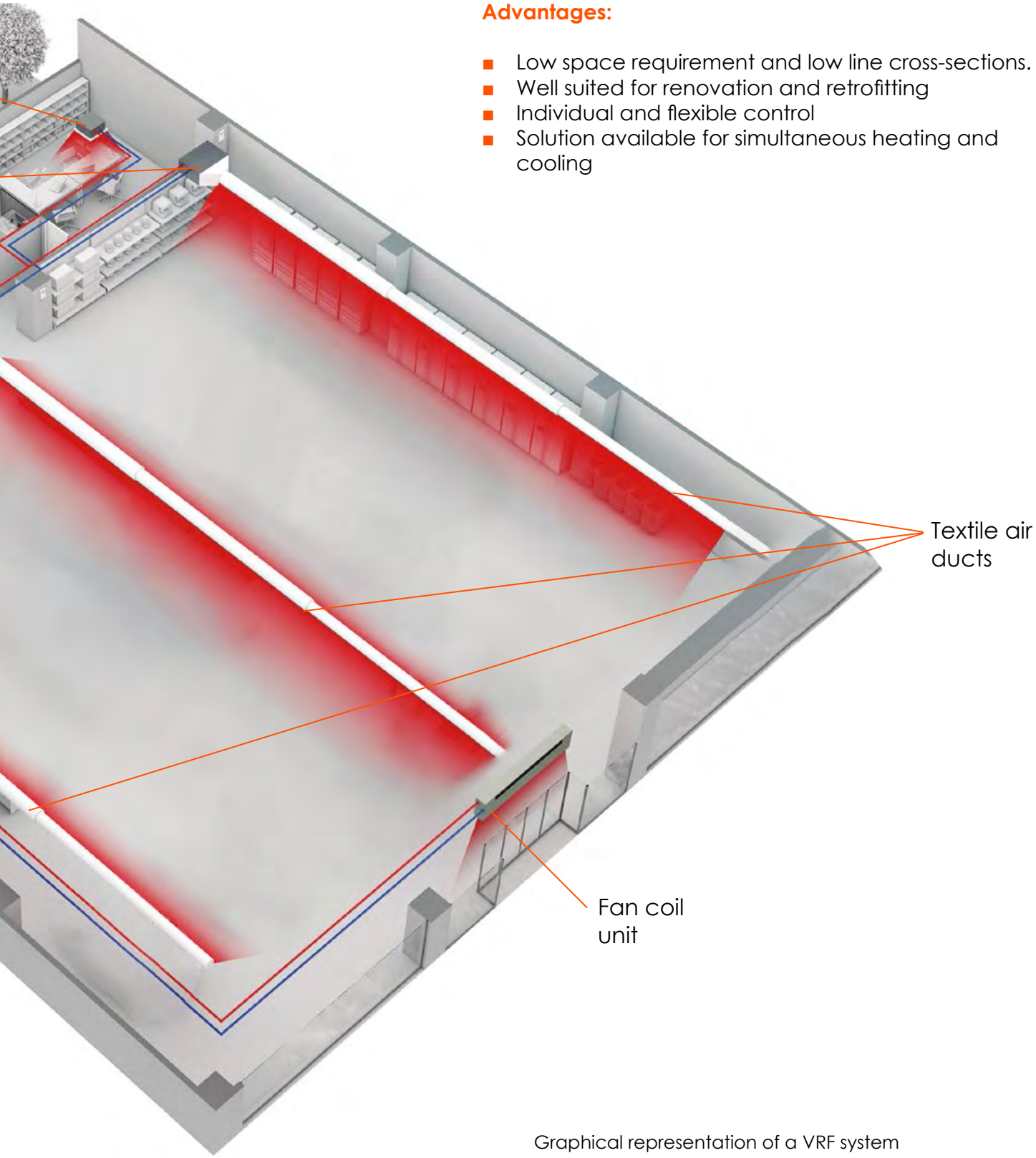
VRF systems (Variable Refrigerant Flow) are used for different demands simultaneously. VRF systems are so-called direct evaporators, which do not require an additional heat transport medium for energy transfer. Since the otherwise usual heat transfer via heat exchanger is associated with heat losses, direct evaporators save the resulting heat losses. The refrigerant therefore flows directly from the outdoor unit to the indoor units. In the process less energy is lost than with water bearing systems. This saves energy costs when heating or cooling.

The VRF system regulates the refrigerant flow rate variably, so that each indoor unit is supplied with the exact amount of refrigerant required at any time. One outdoor unit can thus supply heating or cooling to several indoor units, even of different types.

In addition to ceiling cassettes for offices or meeting rooms, duct units for larger production buildings or warehouses, or DX kits for connecting air handling units, water heat exchangers for cold and hot water preparation can also be supplied.

Advantages:

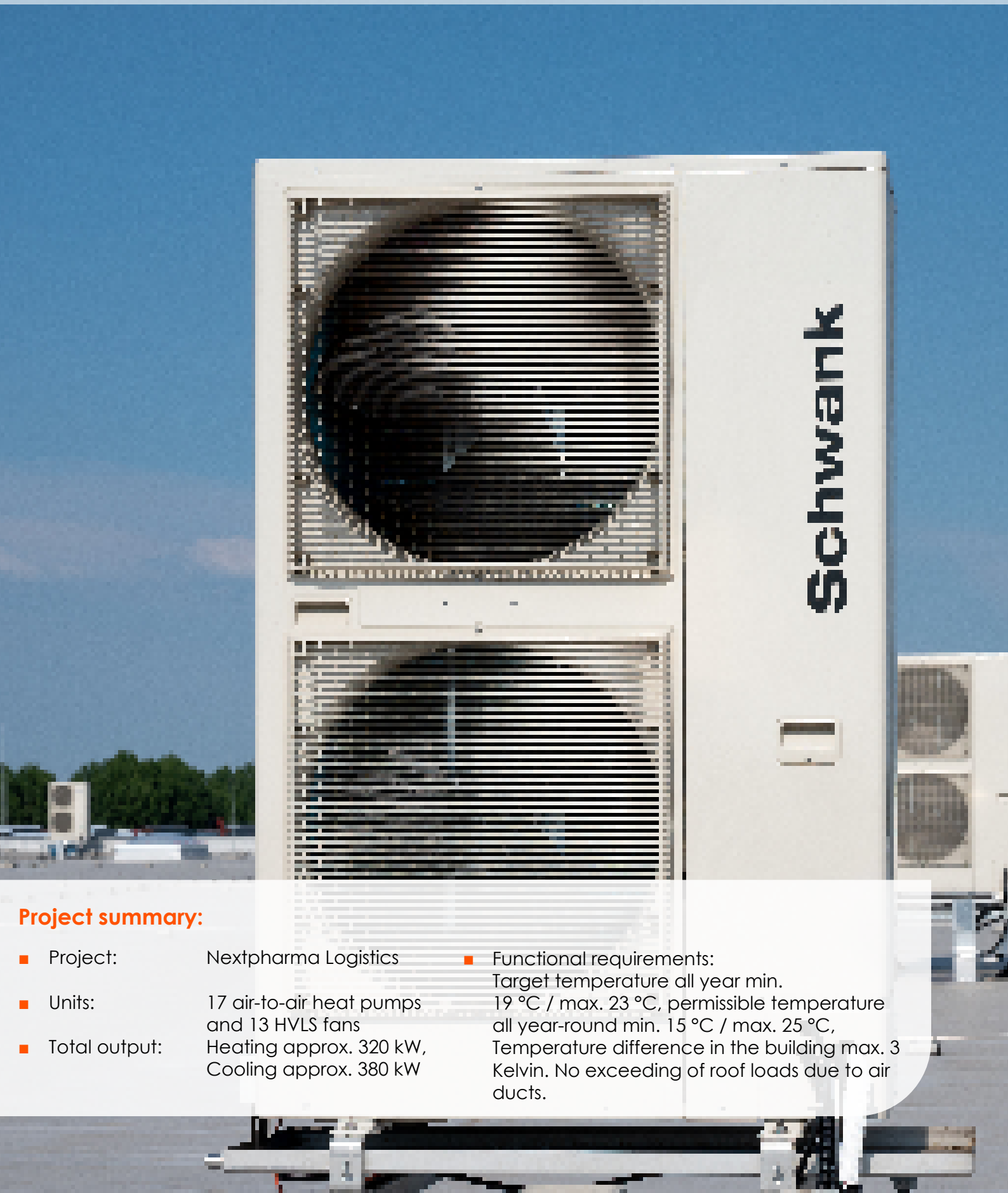
- Low space requirement and low line cross-sections.
- Well suited for renovation and retrofitting
- Individual and flexible control
- Solution available for simultaneous heating and cooling



Graphical representation of a VRF system

References

Uniform temperature control of a pharmaceutical distribution centre with air-to-air heat pumps and HVLS fans

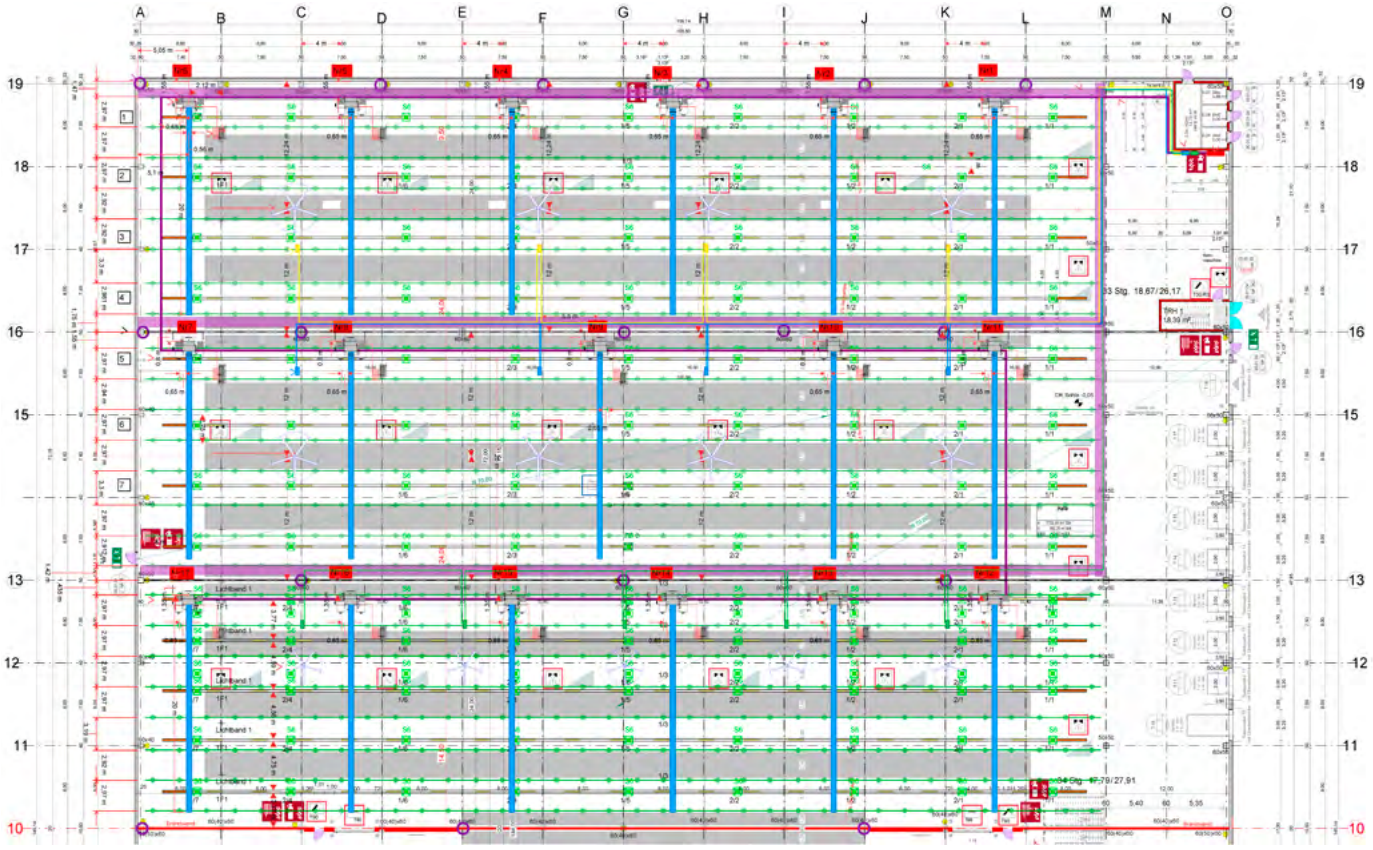


Project summary:

- Project: Nextpharma Logistics
- Units: 17 air-to-air heat pumps and 13 HVLS fans
- Total output: Heating approx. 320 kW, Cooling approx. 380 kW
- Functional requirements: Target temperature all year min. 19 °C / max. 23 °C, permissible temperature all year-round min. 15 °C / max. 25 °C, Temperature difference in the building max. 3 Kelvin. No exceeding of roof loads due to air ducts.

Project information:

- Distribution centre with a floor area of 7,900 m², equipped with high racks
- Air distribution via 340 metre of textile ducts
- Buildings height of 11 metre
- Roof mounting
- Heating and cooling function with year round compliance with specified temperature limits
- SHEVS (smoke and heat extraction systems), skylight domes and racks had to be considered during planning



References

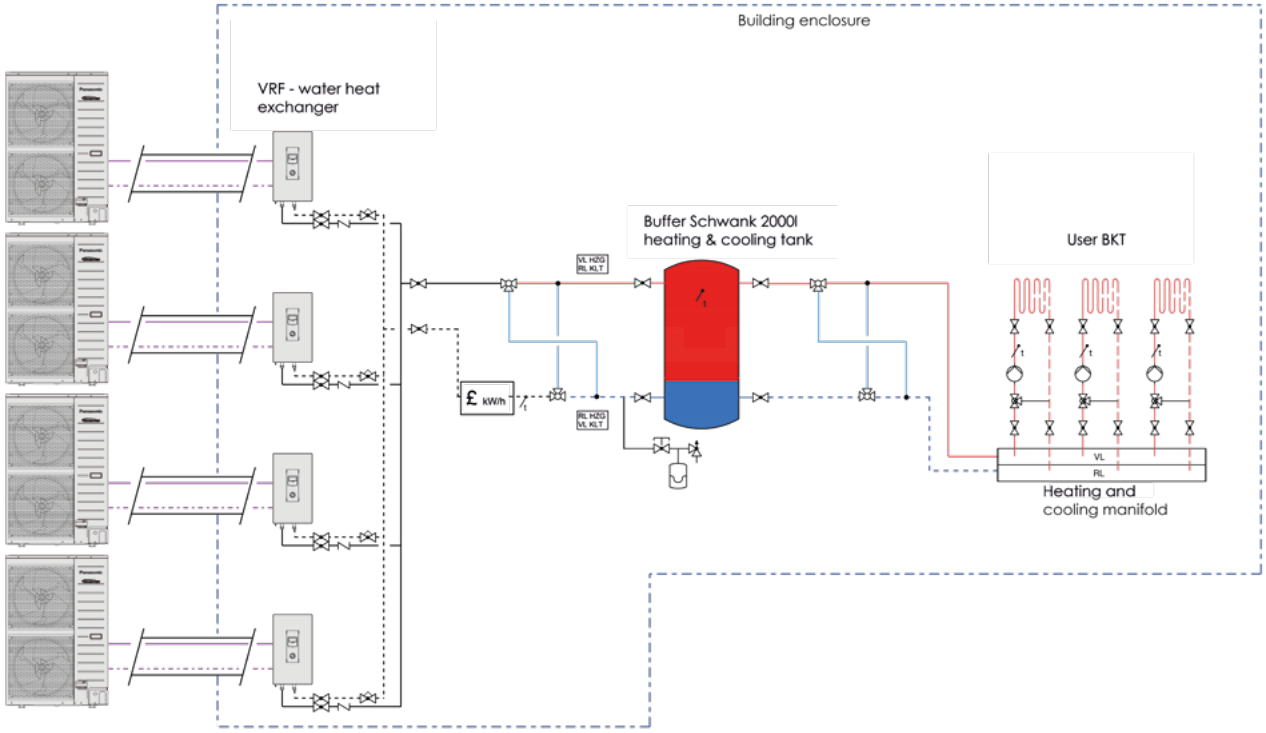
CO_2 - neutral heating and cooling of parcel delivery points with air-water heat pumps

Project summary:

- Project: German Parcel service 9 locations
- Units: Air-to-water heat pump as split system
- Total output: 2, 3 or 4 outdoor units x 16 kW nominal output in cascade connection
- Functional requirements: Predefined central control with remote access via web. Allows access to heating / cooling system as well as other installations such as PV systems.

Project information:

- 9 different construction projects – CO_2-neutral heating of parcel delivery points
- High seasonal performance factor of 4.6
- Ground-mounted enclosure
- Heat pump output until -15 °C outside temperature
- Underfloor/industrial panel heating with low flow temperature
- Cooling function (buffer tank with heating/cooling switch)



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