

Ventilation systems and their components

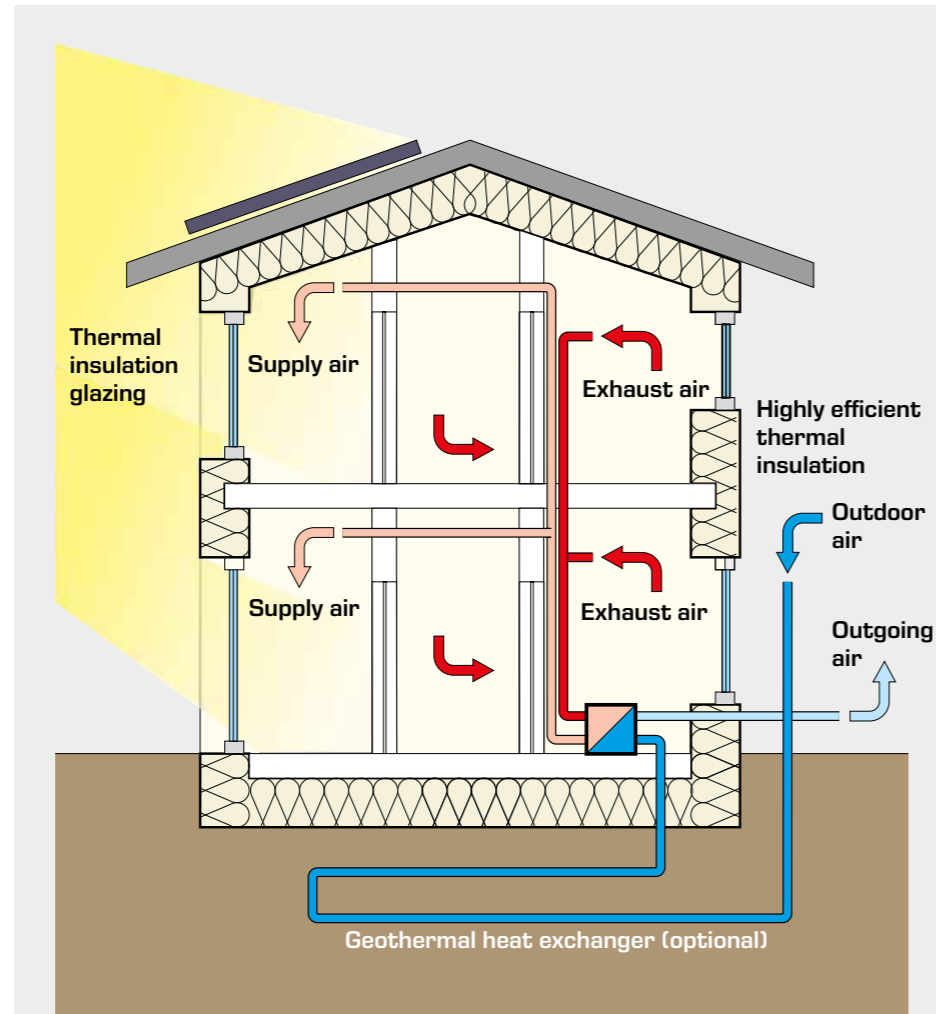
Ventilation systems ensure the change of air in residential, office and equipment rooms.

Ventilation systems are not only concerned with air supply and exhaust, but also with the consideration of **thermal energy**: sophisticated ventilation systems can transfer the heat of the outflowing air to the incoming air, so that hardly any thermal energy leaves the system.

There are basically three types of system:

1. **exhaust air system**: the "used" air from the building is expelled to the outside (outgoing air)
2. **ventilation system**: in addition to the exhaust air system, a supply system supplies fresh air to the living areas
3. **different techniques** that target the saving of heating energy, e.g. via heat recovery or geothermal heat exchangers

These systems are grouped together under the term controlled residential ventilation. Non-controlled ventilation of living space, on the other hand, is the free ventilation of living space by means of window ventilation, joint ventilation or shaft ventilation.



Ventilation with heat recovery

- **outside air**: air drawn in from the environment,
- **outgoing air**: air released into the environment,
- **supply air**: air entering a room or facility after it has been treated, e.g. by filtering or heating
- **exhaust air**: air leaving a room

Components and their roles in ventilation systems

The concept of controlled domestic ventilation works by means of an intelligent interaction of various technical components such as fans/ventilators, heat exchangers, filters, control devices and air distribution. These components are parts of ventilation systems.

Ventilation systems are divided into

- **central systems**: one system controls the ventilation of the entire living space
- **decentralised systems**: several systems used specifically in individual rooms, e.g. kitchen, bathroom, etc.

GUNT offers various experimental units for the investigation of individual components and complete ventilation systems.

Component	Learning objectives	GUNT product
Fans intake and discharge of outside and outgoing air	<ul style="list-style-type: none"> ■ familiarisation with operating behaviour and characteristic variables of fans ■ effect of different impeller shapes on fan characteristic and efficiency ■ effect of the impeller speed on flow rate and pressure 	HM 280 Experiments with a radial fan HM 282 Experiments with an axial fan HM 210 Characteristic variables of a radial fan HL 710 Air duct systems HL 720 Ventilation system
Heat exchangers transfer of heat from the exhaust air to the supply air for heat recovery	<ul style="list-style-type: none"> ■ investigation of convective heat transfer ■ effect of different pipe surfaces on temperature change of the air 	WL 312 Heat transfer in air flow
Tubes, pipe bends, angles, distributors guide direct and distribute air flows	<ul style="list-style-type: none"> ■ determine pressure losses due to friction ■ measure air flow and velocity 	HM 220 Air flow experimental plant HM 240 Principles of air flow
Throttle valves, shut-off butterfly valves adjustment of air volume flows	<ul style="list-style-type: none"> ■ calculation of the volumetric flow rate and the flow velocity 	HM 220 Air flow experimental plant HL 710 Air duct systems HL 720 Ventilation system
Filters, air distribution and diffusers, fire protection, sound absorbers	<ul style="list-style-type: none"> ■ familiarisation with design and function ■ measure pressure losses 	HL 710 Air duct systems HL 720 Ventilation system

