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## Introduction to Ventilation Systems

Modern homes, particularly those that are well-insulated and airtight, often face challenges with indoor air quality. As houses become more energy-efficient, the natural airflow decreases, leading to a build-up of humidity, pollutants, and allergens. Poor ventilation can exacerbate these issues, creating an unhealthy environment that impacts well-being and comfort. This chapter introduces various types of mechanical ventilation, including Positive Input Ventilation (PIV), Mechanical Extract Ventilation (MEV), Demand-Controlled Ventilation (DCV), and Mechanical Ventilation with Heat Recovery (MVHR).

**PIV**: Positive Input Ventilation (PIV) systems introduce filtered fresh air into the home, typically drawing it from the loft. They help reduce condensation and moisture and are generally best suited to milder climates.

**MEV**: Mechanical Extract Ventilation (MEV) systems continuously extract stale air from areas like bathrooms and kitchens to reduce indoor air pollution. While effective at removing stale air, MEV lacks the ability to recover heat.

**DCV** Demand Controlled Ventilation (DCV) adjusts ventilation rates based on occupancy or air quality levels, using sensors to optimise air quality and energy efficiency. However, DCV systems are not ideal for cold, damp climates, as they do not retain heat.

**MVHR**, by contrast, recycles heat from outgoing stale air to warm incoming fresh air. In this chapter, we'll outline why MVHR is the most efficient option for year-round comfort and healthy air quality, particularly in places like the UK, where winters can be cold and heating costs are significant.



Type	Pros	Cons
Type	F103	Cons

PIV Simple and cost-effective installation
Reduces condensation and damp

Ideal for drier climates

**MEV** Continuous extraction of stale air

Simple and relatively affordable Effective for small homes or warmer

climates

**DCV** Adapts ventilation rate based on demand

Energy-efficient due to lower operational

times

Reduces unnecessary ventilation in low-

demand periods

**MVHR** Provides fresh air and removes stale air with Higher initial installation cost

heat recovery

Energy-efficient, reducing heating demand Best suited for airtight, well-insulated

homes

Limited control over humidity
Can introduce cold drafts in
winter

No heat recovery

No heat recovery, leading to

potential heat loss

May increase energy bills in

winter

Higher initial cost due to sensors Maintenance needed for sensors

Not always suitable for

residential spaces

Higher initial installation cost Regular maintenance required Requires space for ducting and

unit installation

Many homeowners rely on trickle vents, small openings in windows or walls, for natural ventilation. While seemingly convenient, these vents often lack the consistency needed to maintain healthy indoor air quality, especially in modern, airtight homes.

#### **Disadvantages of Natural Ventilation**

Trickle vents depend on external factors like wind speed and temperature, making airflow inconsistent. In colder months, they can cause uncomfortable draughts and heat loss, leading to increased heating needs. Trickle vents also lack filtration, allowing outdoor pollutants, allergens, and moisture to enter, which can contribute to issues like dust and mould growth. They do little



to remove indoor pollutants from activities such as cooking or cleaning, which can result in stale, unhealthy air.

#### **Mechanical Ventilation: A Solution for Consistent Airflow**

Mechanical ventilation, such as Mechanical Ventilation with Heat Recovery (MVHR), provides a steady, controlled airflow, unaffected by weather conditions. This ensures that all areas of the home are ventilated consistently, helping prevent damp and condensation. Balanced airflow through MVHR systems also maintains healthy humidity levels, reducing mould risk and protecting surfaces in the home.

#### The Importance of Heat Recovery

Unlike trickle vents, MVHR systems recover up to 97% of the heat from extracted stale air, transferring it to the incoming fresh air. This drastically reduces heating requirements, making MVHR an energy-efficient solution. In contrast, trickle vents allow heat to escape, increasing heating costs during winter.

#### Why MVHR is a Smart Investment

Choosing MVHR over trickle vents means investing in a more comfortable, energyefficient home. MVHR provides consistent ventilation, reduces heating demand, and improves air quality by filtering out pollutants—all benefits that trickle vents cannot match.

### Why Choose MVHR for Your Home?

The decision to install a Mechanical Ventilation with Heat Recovery (MVHR) system is not just about adding a touch of modern comfort—it's a proactive step toward creating a healthier, more energy-efficient home environment. Unlike traditional ventilation systems that may allow heat to escape along with stale air, MVHR systems are designed to retain warmth. They capture up to 97% of the heat from outgoing stale air and transfer it directly to the fresh, incoming air. This sophisticated exchange means you can enjoy a continuous supply of fresh, clean air without losing precious warmth—a feature that's particularly valuable in colder climates like the UK, where maintaining heat can be both costly and essential for comfort.

One of the major advantages of an MVHR system is its ability to regulate indoor humidity levels. Excessive indoor humidity can create the perfect breeding ground for mould and other allergens, which not only pose a risk to respiratory health but can also degrade the home's structure over time. Allergens such as dust mites thrive in damp, poorly ventilated environments, which can exacerbate conditions like asthma and allergies. By maintaining a stable, comfortable humidity level, MVHR systems help to alleviate these issues, enhancing indoor comfort and protecting the home's integrity by reducing moisture buildup on surfaces, walls, and furnishings.

In addition to improved air quality and humidity control, using a Zehnder MVHR system offers homeowners the reassurance of exceptional reliability and minimal maintenance, thanks to its high-quality construction. Zehnder units are renowned in the industry for their energy efficiency, costeffectiveness, and robust durability, making them a smart, long-term investment. Smart Ventilation specifically chooses Zehnder products as they provide a combination of efficiency and lasting value, aligning with our mission to deliver solutions that genuinely improve indoor air quality in a sustainable,



effective manner. This commitment is evident whether we're installing these systems in brand-new builds or retrofitting them into older properties to enhance air quality and

reduce energy waste. With Zehnder MVHR systems, you gain peace of mind knowing your home will stay fresh, healthy, and energy-conscious for years to come.

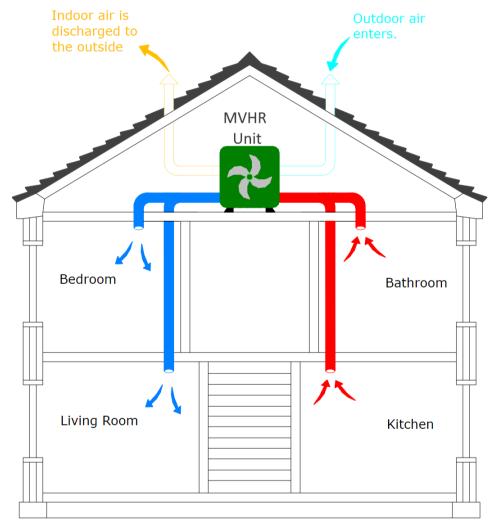
## How MVHR Systems Work

MVHR systems work by continuously supplying fresh air while recovering heat from stale indoor air. The system operates through a network of ducts and fans, with two primary channels: one for extracting stale air from areas like bathrooms and kitchens, and the other for supplying fresh air to bedrooms and living spaces. The stale air passes through a heat exchanger, where up to 97% of the heat is transferred to the incoming fresh air without mixing the two air streams.

The main components of an MVHR system include the unit itself (often located in a loft

or cupboard), ducting, and filters. The ducting connects the system to each room in the house, while highquality filters ensure the incoming air is free from pollen, dust, and other allergens. Zehnder units, used by Smart Ventilation, are equipped with efficient, longlasting heat exchangers and motors designed for quiet, efficient operation.

Installation is straightforward in new builds, as the



system can be incorporated during construction. For retrofits, an expert installation team designs the ductwork to minimize disruption, ensuring optimal performance. In either case, the result is a balanced, energy-efficient ventilation solution that enhances indoor comfort and air quality, particularly suited to today's airtight homes.





### MVHR for New vs. Old Homes

MVHR is ideal for modern, airtight homes where natural airflow is limited. For new builds, MVHR is an essential part of creating a comfortable, energy-efficient living space. It ensures that indoor air remains fresh while minimizing heat loss, essential for meeting modern building standards. Homes built to be airtight benefit from MVHR because it counteracts the lack of ventilation without compromising energy efficiency.

For older homes, retrofitting MVHR can significantly improve air quality, particularly where damp or mould issues are present. Traditional properties often lack adequate ventilation, making them susceptible to humidity and condensation problems. Installing MVHR addresses these concerns by maintaining balanced airflow and reducing moisture build-up. Retrofitting does require some adjustments, but Smart Ventilation offers a combined approach to first and second fixes, limiting disruption for homeowners.

Whether for a new build or retrofit, MVHR is a valuable investment, enhancing comfort, health, and energy efficiency. By choosing high-quality systems like Zehnder, homeowners in both new and older homes can experience improved air quality and a reduction in heating costs, all while protecting their property from moisture-related



# **SMART VENTILATION**

# **HEAT RECOVERY SYSTEMS –**

issues.



# Comparing MVHR with Other Systems

All MVHR (Mechanical Ventilation with Heat Recovery) systems aim to provide fresh, filtered air while reclaiming heat, but performance, efficiency, and lifespan vary significantly based on quality and design. Investing in a high-grade MVHR system means long-term comfort, savings, and reduced maintenance.

For an MVHR system to be effective, it must be correctly sized and designed specifically for your home. Meeting or exceeding regulatory standards, like those in Part F of the UK Building Regulations, ensures the system's efficiency in removing stale air and delivering fresh air. An undersized system may struggle to ventilate effectively, while an oversized one may waste energy and cost more to install.

In colder climates like the UK, cheaper systems might be appealing at first but typically lack the efficiency, durability, and heat recovery capability needed for sustained comfort and savings. They often fall short of building standards, which can compromise air quality and energy efficiency. High-quality systems like Zehnder are designed for longevity and high performance, achieving up to 97% heat recovery, keeping warmth in and lowering heating costs even in winter. This efficiency ensures a stable, comfortable indoor climate with fresh air and reduced energy bills.

When comparing quotes, it's essential to look beyond price alone. Low-cost systems often use basic components and limited design, which may not meet your home's needs or deliver the same performance over time. Comparing the quality of parts, such as anti-static ducting and availability of replacement parts, as well as the overall design tailored to your space, can make a significant difference in long-term value. Premium systems may cost more initially but deliver better efficiency, durability, and ease of maintenance, ultimately providing a more cost-effective solution.

Beyond the main unit, the quality of ducting and components is essential for reliability. Premium systems use anti-static ducting to prevent dust buildup, ensuring cleaner airflow and reducing noise. Readily available parts for premium systems make repairs quicker, minimising downtime and maintaining long-term performance.

Smart Ventilation's choice of Zehnder reflects our commitment to providing MVHR systems that deliver beyond basic functionality. By selecting a right-sized, high-quality system, you invest in superior air quality, energy savings, and regulatory compliance. This ensures your MVHR system will be a lasting asset, enhancing comfort and efficiency in your home for years to come.



## **Understanding Pricing and Costs**

The initial cost of an MVHR system depends on factors such as home size, layout complexity, and the specific model chosen. High-quality systems like Zehnder may require a higher upfront investment, but they deliver long-term value through reliability and efficiency. Smart Ventilation provides detailed, like-for-like quotes, allowing clients to compare options and make informed decisions about their investment.

#### **Example of Running Costs (Based on Latest Electricity Rates)**

Running costs are a key consideration when investing in an MVHR system. While MVHR systems require electricity, they are designed to operate efficiently—typically at around 60% capacity to balance air quality with minimal energy consumption. Zehnder units, with their high-efficiency heat exchangers, can recover up to 97% of the heat from outgoing air, reducing heating demand and resulting in lower energy bills compared to traditional ventilation systems.

We've based this example on the latest average electricity price in the UK, effective from **October 1, 2024**, at **24.50 pence per kilowatt-hour (kWh)**. This ensures our calculations reflect up-to-date costs, making them relevant to current users.

#### **Running Cost Example**

• **Assumptions**: The system runs constantly at 50 watts, which is typical for a small- to medium-sized MVHR unit.

#### 1. Daily Energy Usage:

- 50 watts is equal to 0.05 kW.
- Daily energy consumption is therefore 0.05 kW 24 hours, = 1.2 kWh/day.

#### 2. Daily Running Cost:

• Daily cost: 1.2 kWh by £0.245, = £0.294 / day.

#### 3. Monthly Running Cost:

• Monthly cost: £0.294 x 30  $\approx$  £8.82 / month.

#### 4. Annual Running Cost:

Annual cost: £8.82 x 12 ≈ £105.84 / year.

#### **Long-Term Savings with MVHR**

In colder climates, MVHR systems can provide further savings by reducing heating demand. By recovering up to 97% of the heat from extracted air, systems like those from

Zehnder help offset heating costs, especially during winter months. These long-term savings enhance the value of an MVHR system, making it a wise investment for both comfort and efficiency.

### MVHR System Maintenance: Key Guidelines

Proper maintenance of an MVHR system ensures efficiency, clean air, and longevity, preventing issues like reduced airflow, higher energy costs, and dust buildup. Zehnder MVHR systems are designed for easy upkeep, and following these guidelines will keep your system performing at its best.



#### 1. Filter Replacement: Every 6-12 Months

- Purpose: Filters capture dust and pollen, maintaining clean air circulation.
- **Guideline:** Replace filters every 6 months in high-dust areas or if you have pets; otherwise, annually should suffice.
- **Quick Tip:** Zehnder's accessible filters allow for simple replacement, ensuring optimal airflow.

#### 2. System Servicing: Annually

- **Purpose:** Annual professional servicing checks the unit and key components, preventing potential issues.
- **Smart Ventilation Service:** We offer annual packages, providing thorough inspections and adjustments to keep your system efficient.

#### 3. Duct Cleaning: Every 3-5 Years

- **Purpose:** Duct cleaning reduces dust buildup in the system, improving efficiency and air quality.
- **Guideline:** Clean ducts every 3-5 years, or more frequently in high-dust or high-pollen areas.

#### **Additional Maintenance Tips**

- **Visual Checks:** Inspect the system every few months for any signs of wear or blockage.
- Outdoor Vents: Ensure the intake and exhaust vents remain clear of leaves, debris, or snow.

#### **Benefits of Regular Maintenance**

Air Quality: Keeps indoor air fresh and clean.



- **Efficiency:** Reduces strain on the system, cutting energy costs and extending lifespan.
- **Health Protection:** Minimises dust and allergens, supporting better respiratory health.

By following this simple maintenance plan, you can enjoy the benefits of your MVHR system while safeguarding both your health and investment.

Smart Ventilation's experts are available to answer any specific questions, provide tailored advice, and discuss the benefits of MVHR in more detail. Don't hesitate to reach out if you need further clarity on anything covered here. Further FAQs available on

https://smart-ventilation.co.uk/fag/

#### What is MVHR, and how does it differ from other ventilation systems?

MVHR (Mechanical Ventilation with Heat Recovery) is a system that supplies fresh air while recovering heat from outgoing stale air, helping retain warmth and improve air quality. Unlike other systems like PIV or MEV, MVHR captures up to 97% of the heat, making it energy-efficient and ideal for colder climates.

#### How long does it take to install an MVHR system?

The installation process typically takes 1-3 days for an average home, depending on the property size and complexity. New builds may integrate it faster, while retrofits might require more time to fit ductwork around existing structures.

#### What are the main benefits of MVHR?

MVHR provides fresh, filtered air, reduces indoor humidity, prevents mould growth, and captures heat to reduce heating costs. It enhances air quality, comfort, and energy efficiency, especially in airtight or well-insulated homes.

#### What maintenance is required, and can I do it myself?

Basic maintenance includes changing filters every 6-12 months and occasionally cleaning ducts. Filter changes can often be done by the homeowner, but annual servicing by a professional is recommended for optimal performance.

#### How does MVHR impact my energy bills?

By recovering up to 97% of the heat from outgoing air, MVHR significantly reduces heating demand, resulting in lower energy bills, especially in colder months.

#### Can MVHR be installed in all types of homes?

Yes, MVHR can be installed in most homes. It's especially beneficial in new, airtight

© 01325 238263 info@smart-ventilation.co.uk Darlington, Co. Durham homes but can also improve air quality and reduce moisture in older buildings through careful retrofitting.

#### Are there any health benefits to MVHR?

Yes, MVHR improves indoor air quality by reducing allergens, pollutants, and excess humidity, which can help alleviate respiratory issues and create a healthier living environment.

#### What should I consider when choosing an MVHR system?

Consider your home size, insulation, and layout, as well as the system's efficiency, filter quality, and noise level. It's important to choose a reliable brand with good service options to ensure long-term performance and value.

#### Can MVHR systems work with smart home technologies?

Yes, many modern MVHR systems are compatible with smart home technologies. They can be integrated into home automation systems, allowing you to control ventilation settings remotely or set up automated responses based on air quality or occupancy levels. This can enhance comfort, energy savings, and convenience. This may be a paid upgrade, depending on model.

#### Will an MVHR system increase the noise levels in my home?

No, properly installed MVHR systems are designed to operate quietly. High-quality systems, like those from Zehnder, are known for their silent operation. The system's design and quality of installation are crucial for maintaining low noise levels, so it's best to work with experienced professionals to ensure quiet operation.

#### Does MVHR help reduce condensation on windows?

Yes, by controlling indoor humidity levels, MVHR can significantly reduce condensation on windows, which often results from excess moisture in the air. By continuously exchanging stale, humid air with fresh, filtered air, MVHR helps to prevent condensation buildup and associated issues like mould growth.



#### How does MVHR handle seasonal changes in temperature?

MVHR systems are designed to provide comfortable ventilation year-round. During colder months, they recover heat from outgoing air to warm incoming air, while in warmer weather, they can be adjusted to reduce heat recovery, helping to keep indoor temperatures comfortable.

# Designing the Right MVHR System for Your Home

Finding the perfect MVHR (Mechanical Ventilation with Heat Recovery) system for your home is key to achieving optimal indoor air quality and comfort. At Smart Ventilation, we focus on tailoring every system to match the unique layout, occupancy, and specific needs of your property. Here's what goes into designing the right MVHR system for your space:

### Key Factors to Consider

Several elements influence the choice of an MVHR system for your home:

- **Property Size and Layout**: The square meterage (sqm) of your home and its room layout help us calculate the required airflow.
- Occupancy Levels: The number of bedrooms and overall occupancy level determine how much fresh air the system needs to supply.
- Room Types Wet and Dry Rooms: We split the house in half and extract from
  wet rooms (kitchens, bathrooms, and utility areas) that generate more humidity
  and supply fresh air to dry rooms (bedrooms and living spaces) that require
  steady airflow, allowing for appropriate airflows in each area.
- **Air Quality Needs**: Specific air quality concerns or sensitivities may call for a tailored approach, including filtration options.

### Sizing and System Capacity

The right system size is crucial for balancing efficiency with comfort. To ensure every room receives the correct airflow:

- **Airflow Per Room**: Each room's airflow requirements are calculated individually, based on its size, type, and usage.
- Balancing Wet and Dry Room Needs: Higher extraction rates are set in wet rooms to manage moisture, while dry rooms receive controlled fresh air to maintain consistent indoor quality.
- Optimal Capacity for Longevity: The system is designed to operate at around 60% capacity for efficient, quiet operation and extended life.

### Zehnder Product Range

We exclusively work with Zehnder units, known for their quality, reliability, and ease of service. Our product range includes options designed to handle various property sizes and ventilation needs, from the compact Zehnder Q155 to the larger Q600, all offering excellent energy recovery and low running costs.



### Site Visit and Consultation

Once you've reviewed your quote, our team offers a site visit to confirm all details, including layout, ducting feasibility, and any specific installation requirements. This helps ensure the system is perfectly matched to your home before any work begins.

Contact Smart Ventilation today for a free consultation. Let's design an MVHR system that transforms your indoor environment into a fresher, more comfortable space.



Timeline of Events for Installation

Here's a chronological overview of the steps involved in your installation journey with Smart Ventilation, from the initial conversation to the final commissioning:

#### 1. Initial Conversation

Begin with a consultation to discuss your needs, the benefits of an MVHR system, and how Smart Ventilation can assist.

#### 2. Plans Submitted

After understanding your requirements, homeowners or architects submit detailed plans, including floor layouts and room specifications, allowing Smart Ventilation to assess the project accurately.

#### 3. Design and Quote Creation

Based on your plans, Smart Ventilation designs a bespoke MVHR system tailored to your home. A quote is prepared, detailing the components, costs, and installation timeline.

#### 4. Site Visit

A visit to your property allows us to assess practical aspects, verify measurements, and clarify installation logistics. This ensures everything is prepared for a smooth installation.

#### 5. First Fix Installation

During the initial phase, ducting and other core components are installed. This is typically done at the early stages of building or renovation, ensuring proper integration.

#### 6. Second Fix & Commissioning

In this final stage, the MVHR units are fitted, and all connections are finalised. A detailed commissioning process is carried out, testing the system's performance and ensuring it's functioning optimally.

# Troubleshooting and Common Issues

This chapter on troubleshooting helps you address minor issues independently while also guiding you on when to seek professional help. Keeping your ventilation system in peak condition ensures efficient performance, air quality, and comfort in your home.

#### **Common Problems and Quick Fixes**

Many ventilation issues have simple solutions that can be easily handled at home. Here's a guide to resolving common concerns:

- Low Airflow: If you notice reduced airflow, it may be due to a clogged filter. Check and replace filters regularly to maintain optimal performance. Ensure that vents and intakes are not blocked by furniture or dust.
- **Filter Replacements**: Filters play a critical role in maintaining air quality and system efficiency. It's very important to replace filters with **OEM (Original Equipment Manufacturer) filters**, as aftermarket filters—while often visually similar—can impose additional strain on the motors, potentially burning them out prematurely. Stick with OEM filters to ensure compatibility and long-term reliability. Most systems have indicator lights to alert you when it's time for a change. Generally, filters should be replaced every 3 to 6 months depending on usage and air quality.
- **Minor Noise Concerns**: Systems may produce a slight hum, but unexpected noise (like rattling or whistling) can indicate something has shifted or loosened. Try tightening accessible parts or checking for foreign objects near the vents.

#### When to Contact a Professional

Certain issues require expert intervention to ensure safety and proper functionality. Knowing when to call in a professional prevents minor issues from escalating and safeguards your system's longevity:

- **Airflow Imbalance**: Uneven airflow can reduce ventilation efficiency and may indicate issues with the ductwork or internal mechanisms. If you notice that some rooms receive less airflow than others, this may require recalibration by a trained technician.
- Persistent or Unusual Motor Noise: Loud or unusual sounds like grinding or clicking can indicate a problem with the motor or fan assembly. Prolonged noise can damage system components, so it's best to schedule a service call if this occurs.
- **Unresponsive Controls**: If adjusting the settings doesn't affect your system, there could be an electrical or mechanical issue. A technician can diagnose and resolve this to restore full functionality.

Smart Ventilation's support team is here to help with any issue, big or small. Our trained professionals can assess your system, identify potential concerns, and perform

routine maintenance. Whether you're troubleshooting a minor problem or need a full service call, reach out to us to keep your ventilation system running smoothly and efficiently.

### How to Get Started with Smart Ventilation

Ready to experience the benefits of clean, fresh, and efficient air in your home? Here's how easy it is to start your journey with Smart Ventilation.

#### 1. Get a Free, No-Obligation Quote

Our straightforward quote process begins with a brief consultation. Simply provide us with your floor plans and occupancy details (number of bedrooms, family size) to help us recommend the best system for your unique space. This data allows us to customise a ventilation solution that optimises airflow and energy efficiency tailored to your needs.

#### 2. Plan Your Next Steps

Once you've received your quote, it's time to move forward. Schedule a site survey to confirm design details, explore system customisation options, and map out your installation. We'll work closely with you to ensure the process is smooth, with clear guidance on preparing for each stage of the setup.

#### 3. Why Choose Smart Ventilation?

With Smart Ventilation, you're choosing quality, expertise, and dedicated customer care. Our team brings industry-leading knowledge, premium components, and exceptional service to every project. We're committed to delivering a solution that doesn't just meet but exceeds expectations – for improved air quality, energy savings, and a healthier home environment.

# Take the First Step Towards Better Air Quality Today!



Let Smart Ventilation enhance the comfort and quality of your home with a ventilation solution tailored just for you. **Contact us now to get your free quote** – breathe easier with Smart Ventilation!