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CALIBRE

Technical Overview

EXECUTIVE SUMMARY

Residential heating and cooling systems have traditionally been designed as separate services, each with independent plant, controls, and energy consumption. At the same time, domestic air conditioning systems routinely reject significant quantities of heat to outside during cooling operation - energy that is paid for but wasted.

In a typical five bedroom UK home, cooling systems can reject over 4,000 kWh of thermal energy annually. This represents a substantial and largely untapped energy resource.

Inversa® by Calibre is a residential heat recovery system that addresses both challenges. By capturing rejected heat and integrating heating, cooling, and domestic hot water into a single system, Inversa® improves overall efficiency, simplifies plant design, and reduces external equipment.

The result is a unified residential climate system capable of simultaneous heating and cooling, domestic hot water production, and reduced operational energy consumption.

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CALIBRE CLIMATE

- Experienced designers and engineers who understand both technical performance and design expectations in high-end residential properties
- A full design and delivery service from concept to commissioning
- Dedicated aftercare engineers to support long-term operation

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The Challenge in New or Refurbished Homes

As insulation standards improve and internal heat gains increase demand for residential cooling in UK homes continues to grow. However, conventional system design still treats heating and cooling as separate services:

- Heating provided by boilers or heat pumps
- Cooling provided by separate air conditioning systems
- Independent controls and plant for each system

This approach creates several inefficiencies:

- Rejected heat is wasted
- Multiple external units increase plant space requirements
- Separate controls complicate user operation
- Installation and maintenance responsibilities are split

These factors increase cost, complexity, and energy consumption.

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The Wasted Energy Opportunity

All cooling systems remove heat from indoor spaces and reject it externally. In conventional systems:

- Indoor units absorb heat from occupied spaces
- Refrigerant transfers heat to an external condenser
- Heat is rejected to the outside air

In large homes with multiple cooling zones, this rejected heat can exceed 4,000kWh annually - comparable to domestic hot water demand in many households.

Despite this, residential systems rarely recover this energy due to a lack of residential-scale heat recovery solutions.

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The Inversa® Solution

Inversa® by Calibre replaces the traditional air-cooled condenser with an internally mounted water-cooled heat-recovery condenser linked to an external air source heat pump. By controlling refrigerant conditions and water flow, the system produces usable water temperatures of up to 50°C during cooling application.

Recovered heat can be used for:

- Domestic hot water pre-heating
- Low-temperature space heating

Typical applications include:

- Underfloor heating
- Low-temperature radiators
- Towel rails

This enables simultaneous heating and cooling across different zones within the home.

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Integrated Heating and Cooling

Inversa® by Calibre combines heating and cooling into a single integrated controls system. This removes the need for traditionally separate thermostats and controllers, and provides:

- One system for heating and cooling
- Unified zone controls
- One installation contractor for both heating and cooling
- One maintenance provider

Each zone is managed using a wired thermostat controller, allowing users to select heating or cooling from a single interface.

The system can also be controlled on an app, giving users full room-by-room temperature control and system visibility from their smart device, whether at home or away.

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Reduced External Plant

Traditional residential HVAC installations often require:

- One outdoor unit for heating (heat pump)
- One outdoor unit for cooling (air conditioning)

Inversa® by Calibre reduces this to:

- One external air-to-water heat pump
- Internal plant room components

This reduces:

- External space requirements
- Visual impact
- Installation complexity

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Benefits for Homeowners

- Lower energy bills through heat recovery
- Domestic hot water generated during cooling operation
- Simultaneous heating and cooling for improved comfort
- One integrated heating, cooling and hot water system
- Single supplier responsibility for installation and maintenance
- Reduced external plant and improved aesthetics
- Simplified controls across all zones
- Reduced carbon footprint
- Future remote monitoring capability for performance and maintenance

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Benefits for Architects and Specifiers

- Reduced operational energy consumption
- Improved EPC and SAP outcomes
- Reduced external plant requirements
- Simultaneous heating and cooling capability
- Simplified system coordination
- Flexible zoning for high-performance homes
- Alignment with low-carbon building strategies

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Conclusion

Inversa® by Calibre addresses multiple limitations of conventional residential HVAC design. By recovering rejected cooling energy and integrating heating, cooling and domestic hot water into a single system, Inversa® improves efficiency, reduces plant requirements, and simplifies operation.

The result is a compact, residential heat-recovery system designed for modern, high-performance homes.