

Heat Pump Installation Assessment Report

Assessment Date: December 16, 2025

Executive Summary

Recommended Heat Pump Size: 5kW

Low Loss Header/Buffer: Not Required

Expected SCOP: 3.2 - 3.6

Overall Assessment: Excellent candidate property for heat pump installation

Property Details

Parameter	Value
Downstairs Heating	40m ² Underfloor Heating (UFH)
Upstairs Heating	8 radiators on 8mm microbore pipework
Zoning	None - all radiators balanced
Current Boiler Power	7kW (limited)
Flow Temperature	<45°C
Internal Temperature	20.5°C (all rooms)
Boiler Runtime at -3°C	25 min/hour (42% duty cycle)
Delta T (Stage 1/2)	10°C / 5°C

Annual Gas Consumption 6,200 kWh

Heat Pump Sizing Analysis

Heat Loss Calculation

- Boiler operates at 7kW limited power
- At design conditions (-3°C): 25 min/hour runtime = 42% duty cycle
- Actual heat loss at -3°C: $7\text{kW} \times 0.42 = \sim 2.9\text{kW}$
- Annual consumption breakdown:
 - Space heating: $\sim 4,500\text{ kWh}$
 - Domestic hot water: $\sim 1,700\text{ kWh}$

Why 5kW is Optimal

- Provides adequate capacity for peak demand ($\sim 2.9\text{kW}$) with appropriate safety margin
- Avoids oversizing that would cause excessive cycling and reduced efficiency
- Exceptionally low flow temperatures ($<45^\circ\text{C}$) indicate excellent building fabric
- 40m^2 UFH provides ideal low-temperature distribution

Alternative Sizes Considered

- **4kW:** Marginal - insufficient headroom for DHW and cold snaps
- **6kW+:** Oversized - would reduce SCOP through excessive cycling

Hydraulic Components Assessment

Low Loss Header / Buffer Tank

Recommendation: Neither Required

- 40m² UFH provides substantial thermal mass and system volume
- Total system volume (UFH + 8 radiators) likely exceeds 100 litres
- No zoning = full system always active, preventing short cycling
- Modern modulating heat pumps handle this configuration well

Caveat: If selected heat pump has minimum output >2kW and cycles excessively in mild weather, consider adding a small 50L buffer tank.

Flow Rate Analysis

Current System Flow Rates

Configuration	Delta T	Flow Rate
Stage 1 Pump Speed	10°C	10 L/min (600 L/h)
Stage 2 Pump Speed	5°C	20 L/min (1,200 L/h)

Required for 5kW Heat Pump

- Target Delta T: 5°C (standard for heat pumps)
- Required flow rate: 14.3 L/min (857 L/h)
- **Current Stage 2 flow rate (1,200 L/h) exceeds requirements ✓**

Microbore Pipework Considerations

- 8mm microbore is the main system constraint
- Flow distribution: 857 L/h total ÷ 8 radiators = ~107 L/h per radiator
- 8mm pipe should be acceptable at these flow rates
- Higher pressure drop than 10/15mm pipe - heat pump circulator must provide 4-6m head
- **Recommendation:** Calculate exact pressure drop; consider replacing longest/most restrictive microbore runs if marginal

Expected Performance

Seasonal Coefficient of Performance (SCOP): 3.2 - 3.6

Factors Supporting High SCOP:

- Very low flow temperatures (<45°C proven in operation)
- Underfloor heating downstairs (typically 35-40°C flow)
- Well-insulated property with very low heat loss
- UK climate (Potters Bar) with mild winters

Factors Limiting SCOP:

- Upstairs radiators may require 45-50°C flows depending on sizing
- DHW heating to 50-55°C reduces annual SCOP
- Small heat pump working harder during peak demand periods

Projected Running Costs

System	Annual Consumption	Cost (@25p/kWh elec, 6p/kWh gas)
Current Gas Boiler	6,200 kWh gas	~£370/year
5kW Heat Pump (SCOP 3.3)	~1,880 kWh electricity	~£470/year

Note: Costs based on December 2025 energy prices. Consider renewable energy tariffs and government incentives.

Installation Recommendations

1. **Radiator Survey:** Verify upstairs radiators are adequately sized for 45-50°C flow temperatures. Consider heat output calculations for each radiator.

2. **Weather Compensation:** Essential for maximizing SCOP. Outdoor sensor will adjust flow temperature based on ambient conditions.
3. **Hydraulic Separation:** Not required given current system volume and characteristics.
4. **Controls:** Minimum requirements:
 - Room thermostat
 - Outdoor sensor for weather compensation
 - Consider smart controls for optimization
5. **DHW Cylinder:** Recommend 180-210L capacity with efficient coil (25-30kW @ 45°C) appropriate for low DHW demand (1,700 kWh/year).
6. **System Flushing:** Thorough power flush and inhibitor treatment before heat pump installation.
7. **Pump Head:** Specify heat pump with adequate circulator head (4-6m) to overcome microbore pressure drop.

Conclusion

This property represents an **excellent candidate for heat pump installation** - one of the best scenarios encountered in practice. Key positive factors include:

- Exceptionally low existing flow temperatures (<45°C)
- Very low heat loss (2.9kW at -3°C design conditions)
- Substantial underfloor heating providing thermal mass
- Low annual energy consumption (6,200 kWh total)
- Well-balanced system with no zoning complications

The 5kW heat pump recommendation provides optimal balance between capacity, efficiency, and system longevity. The expected SCOP of 3.2-3.6 should deliver excellent performance with reasonable running costs.

Main consideration: Verify upstairs radiator sizing and microbore pressure drop calculations to ensure adequate heat delivery at reduced flow

temperatures.

Report prepared: December 16, 2025

Assessment type: Heat Pump Feasibility Study

This report is based on the information provided. Final installation specifications should be confirmed by MCS-certified installer with on-site verification.