Fusion.

Specification guide

remeha

What's inside.

Remeha, the expert choice.

Complete commercial solutions from the experts in sustainable heating and hot water.

Choose Remeha's advanced commercial Gas Absorption Heat Pumps for your next commercial project. We invest heavily in research and development which enables our specialist teams to design high performance products at every level. From using the latest materials and manufacturing techniques to meticulously designing and engineering each product, we ensure they're efficient to specify, install, run and maintain.

We're the experts in heating and hot water solutions, built with sustainable technology. Our teams will guide you through the right choices for your commercial heating and hot water project. So from specification to sign-off through to supply and handover, our customer service and product support is second to none.

Introducing Remeha Fusion.

The Fusion 35kW Gas Absorption Heat Pump (GAHP) is a high-efficiency, low carbon solution for low grade heating and hot water generation, that can significantly improve the environmental rating of a building and lower its operating costs.

The Fusion can achieve outstanding seasonal Gas Utilisation Efficiencies (GUE) of up to 165% under ideal conditions – delivering reliable operation even at low outside temperatures and continuous heating in defrost operation.

It can be supplied as a single unit, in cascade arrangement or as a complete new design in a hybrid system in conjunction with condensing boilers. The Fusion is equally suitable for both new build and refurbishment projects for commercial, industrial and larger residential applications.

A key advantage of the Fusion is its use of gas rather than electricity for operation. By using gas directly at the point of use, GAHPs can provide 98% of usable heat energy – around twice that of electrically-operated heat pumps – resulting in less energy waste and a smaller carbon footprint.

The Fusion also cuts operating costs as natural gas is typically around a third of the price of electricity, and provides an additional 65% of heat by drawing in energy from the air.

As it requires only an extremely low electrical running current to operate – just 1.09kW for a single unit – there is no need to increase the electrical incoming supply – so it's a straightforward and affordable retrofit option.

The strong environmental benefits of the Fusion are further enhanced by the use of an ammonia refrigerant which has zero ozone depletion potential and zero global warming potential.

Features and benefits.

Renewable technology	> Low carbon solution to heating and hot water > Meets the carbon requirements of Part L > Improves the environmental rating of a building
High Gas Utilisation Efficiency ≤165%	> Exceptional efficiencies > Significant reduction in emissions > Lower operating costs
Uses gas rather than electricity for operation	> Reduces operating costs due to the lower price of natural gas > More efficient as uses gas at the point of use > Improves the environmental rating of a building > More easily retrofitted as no need to upgrade incoming electrical supplies due to low electrical load
Uses ammonia, a naturally forming chemical, as refrigerant	BREEAM credits: > Zero ozone depletion potential > Zero global warming potential
Refrigerants, low carbon technology and NO_x emissions	Eligible for up to five BREEAM credits
High performance	> High-efficiency, reliable operation even at low outside temperatures > Continuous heating even in defrost operation
Easy installation	Comes assembled and is connection ready
Flexible	> Can be installed as a single unit, in cascade, as a hybrid system with boilers, or in combination with existing units > Can be used for new or existing buildings
Reliable high performance	> Modulating from 100-50% > Built-in control strategy to protect against freezing > Control via 0-10V, or on/off
Class 5 NO_x emissions	> Environmentally-friendly operation
ErP compliant	> A/A+ rated

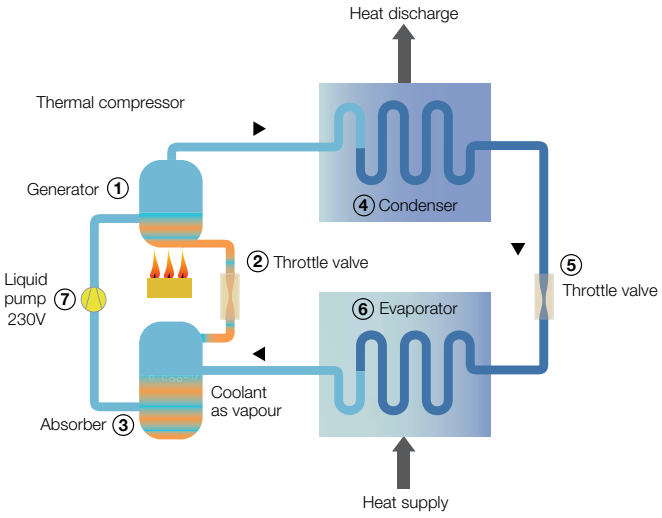
Typical
boiler construction.

- Steel sealed circuit, externally treated with epoxy paint
- Sealed combustion chamber suited for type C installation
- Metal mesh radiant burner equipped with ignition electrodes and flame detection, managed by an electronic flame control box
- Titanium stainless steel shell-and-tube heat exchanger, with external insulation
- Recovery heat exchanger (AISI 304L)
- Air heat exchanger with single-row finned coil, manufactured with steel pipes and aluminium fins
- Automatic microprocessor-controlled two-way defrosting valve
- S61 electronic board with integrated microprocessor, LCD display and control knob, complete with Mod10 auxiliary card to control thermal capacity and primary pump modulation
- Water flow meter
- Sealed circuit high-temperature limit thermostat, with manual reset
- Flue temperature thermostat 120°C, with manual reset
- Sealed circuit safety relief valve
- Safety by-pass valve, between high and low pressure parts of the sealed circuit
- Antifreeze functions for hydraulic circuit
- Ionisation flame control box
- Double shutter electric gas valve

Fusion
operating principle.

A heat pump is a device that transfers heat with the aid of a refrigeration cycle. The Fusion operates by capturing energy from the surrounding air, which converts to higher temperatures with the aid of an ammonia/water refrigeration cycle.

Operation of gas absorption heat pump

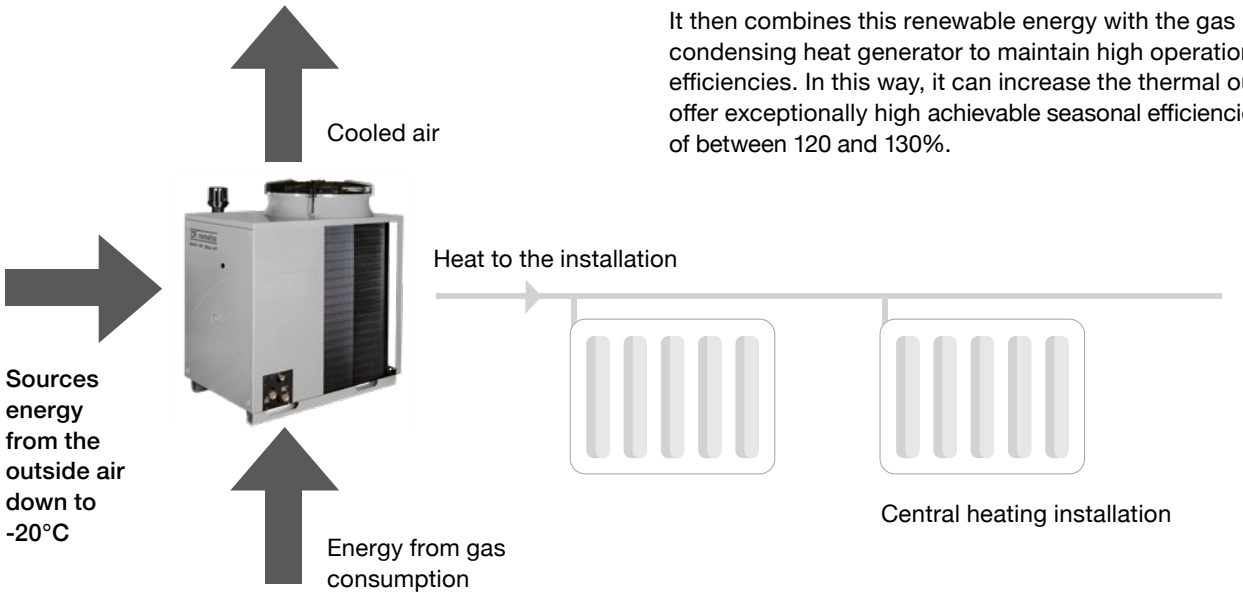


The high performance of this heat pump means that it delivers reliable operation even at low outside temperatures and continuous heating in defrost operation.

A gas-fired heat pump is not fitted with an electrical compressor, like an electric heat pump. Instead, it works on a second loop process, using ammonia dissolved in water, with ammonia acting as the refrigerant and water as the absorbent.

The mixture is heated by the gas burner in the generator (1). The refrigerant evaporates and is separated from the water. The water is transferred to the absorber (3) via the throttle valve (2). The ammonia vapour is directed to the condenser (4), where it condenses and transfers the condensing heat to the central heating water. The liquid goes to the evaporator (6) via the throttle valve (5), where it evaporates while absorbing heat from the outside air. The vapour then goes to the absorber and comes into contact with the water, which has low levels of ammonia. This is where the refrigerant is absorbed into the solution. The vapour is absorbed by the water, resulting in a solution that's rich in ammonia. The heat released during this process is transferred to the central heating water with the residual heat from the generator, which increases the efficiency of the heat pump. The rich solution is taken by the liquid pump (7) to the generator (1) and the process starts again from the beginning.

It then combines this renewable energy with the gas condensing heat generator to maintain high operational efficiencies. In this way, it can increase the thermal output to offer exceptionally high achievable seasonal efficiencies of between 120 and 130%.



Fusion
technical information.

A+ Efficiency Rating

A Efficiency Rating

Fusion 35kW (Single unit)		
Nominal volume flow ΔT 10°C	m^3/h	3
Nominal pressure loss	kPa	43
Maximum flow temperature of central heating water	°C	65
Nominal gas consumption m3/h	15ºC, 1013 mbar	
	G20	2.44
	G30	2.03
GUE efficiency	% (nominal) output 38.3 kW)	152*
Nominal input	kW	25.7
Nominal output	kW	38.3*
Flue gas flow rate	kg/h gas	972
Supply voltage	230V – 50hz	
Electrical power absorption (+/-10%)	kW	1.09
Net weight	kg	400
Hydraulic connections	inch	1¼ F
Gas connection diameter	inch	¾ F
Flue discharge diameter	mm	80
Dimensions	(WxHxD) mm	848 x 1537 x 1258
Insulation class	IP	X5D
Eco Design ErP rating	@ 55°C @ 35°C @ 35°C	A+ A
Eco Design rated heat output warmer/average/ colder climate conditions	kW @ 55°C	29/29/36
Eco Design rated heat output warmer/average/ colder climate conditions	kW @ 35°C	30/36/40

*GUE A7W50 152% nominal output: 38.3kW.
All data and values are provisional. Installation according to national guidelines.

Fusion
performance.

An important benefit offered by GAHPs is their ability to achieve continuously high seasonal efficiencies even at lower outside temperatures. Nevertheless, the seasonal efficiencies of GAHPs, like any heating technology, depend on several factors. For GAHPs, the heat outputs and efficiencies vary according to the flow/return heating temperatures and the outside temperature.

To provide real-world data on the Fusion, we've compiled detailed performance tables listing the achievable heat output and efficiency figures according to the outside temperature and the flow/return heating temperature of the system.

The table illustrates how in March, for example, when the average minimum temperature according to Met Office data is just 2°C, a single Fusion unit operating on a system at low flow and return temperatures of 60°/40°C would deliver an outstanding 141.2% efficiency, providing 35.6kW heat output. As the flow and return temperatures increase, the achievable efficiency and heat output will fall slightly. So at 70°/50°C, the same GAHP at the same outdoor temperature will operate at 128.1% efficiency with a heat output of 32.3kW, dropping to 116.6% efficiency and an output of 29.4kW at 82°/71°C. This detailed reference tool can be used to provide an accurate calculation of the seasonal efficiency and heat output that the Fusion will achieve in a particular application.

For further advice, please contact your Area Sales Manager on **0345 070 1055** or email **info@baxiheating.co.uk**

Month	Met Office min temp °C	Output/ efficiency	Heating system design**		
			60/40	70/50***	82/71****
Jan	1.3	Output kW	33.1	31.3	28.6
		Efficiency %	131.4	128.2	113.5
Feb	1.1	Output kW	33.1	31.3	28.6
		Efficiency %	131.4	128.2	113.5
Mar	2.6	Output kW	35.6	32.3	29.4
		Efficiency %	141.2	128.1	116.6
Apr	3.9	Output kW	35.9	33.9	29.8
		Efficiency %	139.3	132.6	118.3
May	6.7	Output kW	38.5	37.7	31.1
		Efficiency %	151.1	137.2	123.6
June	9.5	Output kW	No heat required		
		Efficiency %			
July	11.7	Output kW			
		Efficiency %			
Aug	11.5	Output kW			
		Efficiency %			
Sept	9.6	Output kW			
		Efficiency %			
Oct	6.9	Output kW	38.5	37.7	31.1
		Efficiency %	151.1	137.2	123.6
Nov	3.8	Output kW	35.9	33.9	29.8
		Efficiency %	139.3	132.6	118.3
Dec	1.6	Output kW	33.1	31.7	29.0
		Efficiency %	131.4	128.8	115.0
Average heat output kW			35.5	33.7	29.7
Seasonal efficiency %			139.5	131.6	117.8

Source: Met Office 1981-2010
**Outside temperature -3°C ***Fusion $^{2}/_{3}$ heat load split ****Fusion $^{1}/_{3}$ heat load split

Technical information
and performance.

Heat output (kW) performance

Outdoor Temp °C	Heating °C						HWS
	40	45	50	55	60	65	70
-20	31.5	29.6	27.7	25.7	23.7	22.7	9.3
-19	31.8	29.9	28.0	26.0	23.9	22.9	9.5
-18	32.0	30.1	28.2	26.2	24.2	23.2	9.6
-17	32.3	30.4	28.5	26.5	24.4	23.4	9.7
-16	32.5	30.6	28.7	26.7	24.7	23.7	9.8
-15	32.8	30.9	29.0	27.0	24.9	23.9	10.0
-14	33.0	31.1	29.2	27.2	25.2	24.2	10.1
-13	33.3	31.4	29.5	27.5	25.5	24.4	10.2
-12	33.5	31.6	29.7	27.7	25.7	24.7	10.3
-11	33.8	31.9	30.0	28.0	26.0	24.9	10.5
-10	34.0	32.1	30.2	28.2	26.2	25.2	10.6
-9	35.0	32.9	30.8	28.7	26.6	25.4	10.7
-8	36.0	33.7	31.4	29.2	27.0	25.5	10.8
-7	37.0	34.5	32.0	29.7	27.5	25.7	11.0
-6	37.4	34.9	32.4	30.2	28.0	26.1	11.0
-5	37.7	35.2	32.7	30.6	28.5	26.4	11.1
-4	38.1	35.6	33.1	31.0	29.0	26.8	11.1
-3	38.5	35.9	33.4	31.4	29.5	27.1	11.2
-2	38.8	36.3	33.8	31.9	30.0	27.5	11.2
-1	39.0	36.7	34.4	32.3	30.1	27.8	11.3
0	39.2	37.1	35.1	32.7	30.3	28.2	11.3
1	39.4	37.6	35.8	33.1	30.4	28.6	11.4
2	39.6	38.0	36.5	33.5	30.5	29.0	11.5
3	39.7	38.3	36.8	33.9	31.0	29.4	11.6
4	39.8	38.5	37.2	34.4	31.5	29.8	11.7
5	40.0	38.8	37.5	34.8	32.0	30.2	11.8
6	40.1	39.0	37.9	35.2	32.5	30.7	11.9
7	40.2	39.3	38.3	35.7	33.0	31.1	12.0
8	40.4	39.4	38.5	36.0	33.5	31.6	12.1
9	40.5	39.6	38.7	36.3	34.0	32.0	12.3
10	40.6	39.8	38.9	36.6	34.4	32.5	12.4
11	40.8	39.9	39.0	37.0	34.9	33.0	12.5
12	40.9	40.1	39.2	37.3	35.4	33.4	12.7
13	41.0	40.2	39.4	37.6	35.8	33.9	12.8
14	41.2	40.4	39.6	38.0	36.3	34.3	13.0
15	41.3	40.6	39.8	38.3	36.8	34.8	13.1

A non-exhaustive range of temperatures has been provided. Performance will vary dependent on temperature changes.

Technical information
and performance.

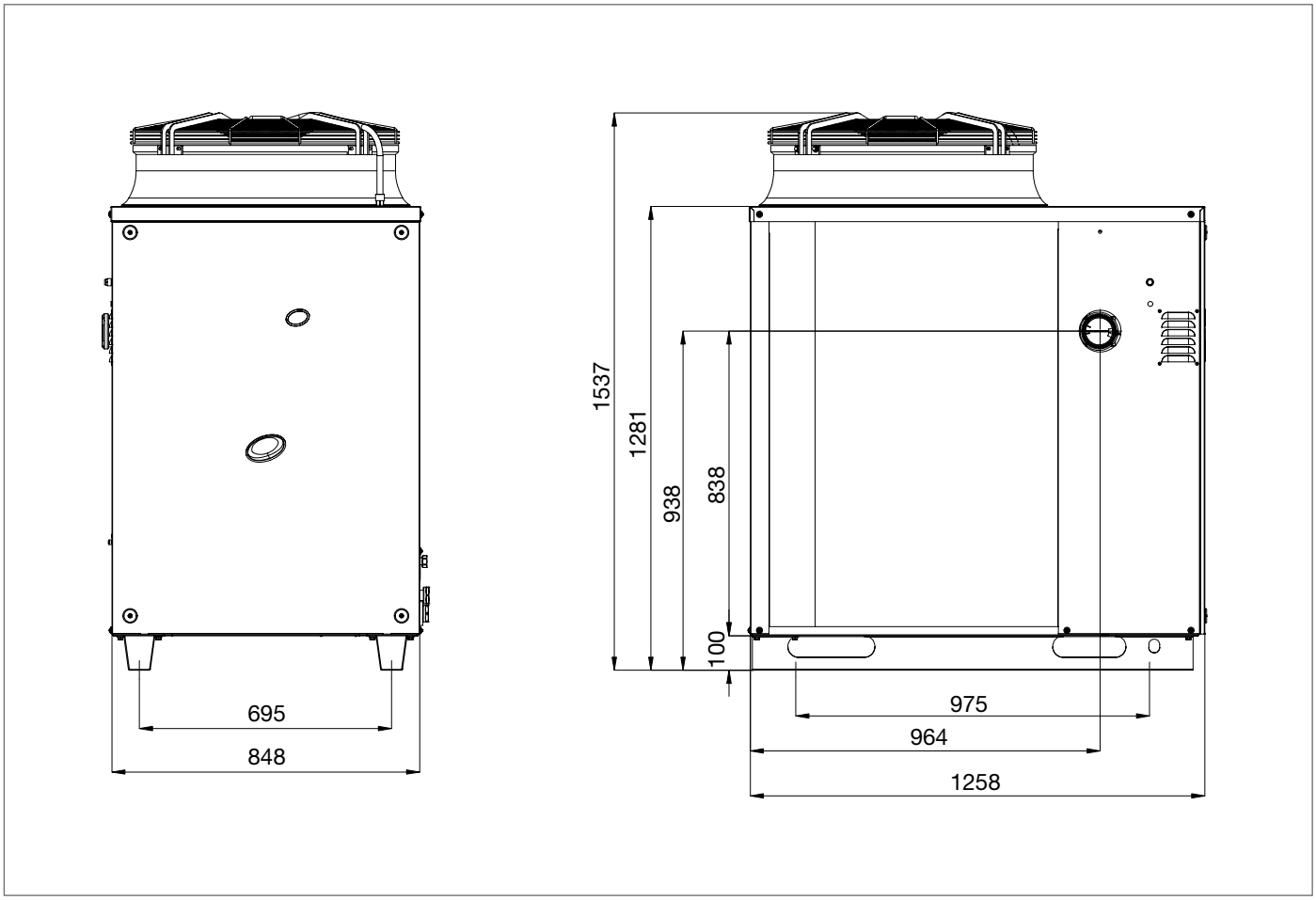
Gas Utilisation Efficiency (GUE) performance

Outdoor Temp °C	Heating °C						HWS
	40	45	50	55	60	65	70
-20	1.250	1.175	1.100	1.020	0.940	0.900	0.740
-19	1.260	1.185	1.110	1.030	0.950	0.910	0.750
-18	1.270	1.195	1.120	1.040	0.960	0.920	0.760
-17	1.280	1.205	1.130	1.050	0.970	0.930	0.770
-16	1.290	1.215	1.140	1.060	0.980	0.940	0.780
-15	1.300	1.225	1.150	1.070	0.990	0.950	0.790
-14	1.310	1.235	1.160	1.080	1.000	0.960	0.800
-13	1.320	1.245	1.170	1.090	1.010	0.970	0.810
-12	1.330	1.255	1.180	1.100	1.020	0.980	0.820
-11	1.340	1.265	1.190	1.110	1.030	0.990	0.830
-10	1.350	1.275	1.200	1.120	1.040	1.000	0.840
-9	1.390	1.307	1.223	1.140	1.057	1.007	0.850
-8	1.430	1.338	1.247	1.160	1.073	1.013	0.860
-7	1.470	1.370	1.270	1.180	1.090	1.020	0.870
-6	1.484	1.384	1.284	1.197	1.110	1.034	0.874
-5	1.498	1.398	1.298	1.214	1.130	1.048	0.878
-4	1.512	1.412	1.312	1.231	1.150	1.062	0.882
-3	1.526	1.426	1.326	1.248	1.170	1.076	0.886
-2	1.540	1.440	1.340	1.265	1.190	1.090	0.890
-1	1.547	1.457	1.366	1.281	1.195	1.105	0.895
0	1.555	1.474	1.393	1.297	1.201	1.120	0.900
1	1.562	1.491	1.420	1.314	1.206	1.135	0.905
2	1.570	1.509	1.448	1.330	1.212	1.150	0.910
3	1.575	1.519	1.462	1.347	1.231	1.166	0.918
4	1.581	1.528	1.476	1.363	1.251	1.183	0.926
5	1.586	1.538	1.490	1.380	1.270	1.200	0.934
6	1.591	1.548	1.504	1.397	1.291	1.218	0.942
7	1.597	1.558	1.519	1.145	1.311	1.236	0.950
8	1.602	1.565	1.527	1.428	1.329	1.254	0.961
9	1.607	1.571	1.534	1.441	1.348	1.272	0.973
10	1.613	1.578	1.542	1.454	1.367	1.290	0.984
11	1.618	1.584	1.549	1.467	1.385	1.308	0.995
12	1.624	1.590	1.557	1.480	1.404	1.326	1.006
13	1.629	1.597	1.565	1.494	1.423	1.344	1.018
14	1.634	1.603	1.572	1.507	1.441	1.362	1.029
15	1.640	1.610	1.580	1.520	1.460	1.380	1.040

A non-exhaustive range of temperatures has been provided. Performance will vary dependent on temperature changes.

Fusion
dimensions.

The Fusion is only suitable for external siting. A single Fusion is 848mm W x 1537mm H x 1258mm D. The Fusion has been optimised to operate with heating system flow temperatures of up to 65°C and is suitable for production of hot water.



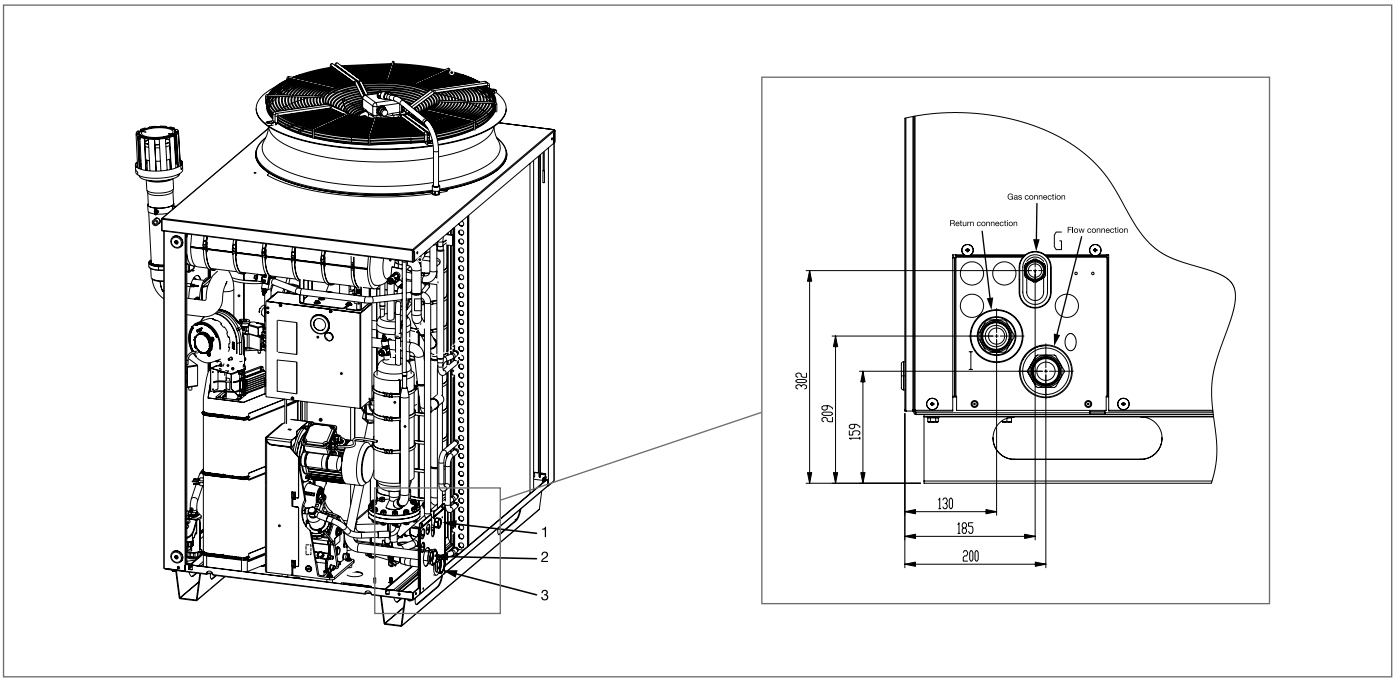
The Fusion should be sized to achieve 4,000 hours or greater and to take into account the base heating load. Buffer vessels are normally used as part of the system design. A low noise brushless fan is fitted, which keeps the environmental noise down to a minimum. Anti-vibration pads are available to reduce the transmission noises throughout the building. The Fusion is suitable to be used in conjunction with the Remeha condensing boiler range. It's suitable for on/off, 0-10v and Open Therm modulating control systems, making it even simpler to integrate with the Quinta Ace range, Gas 210 Eco Pro and Gas 320/620 Ace.

For further advice, please contact your **Remeha expert on 0345 070 1055** or **email info@baxiheating.co.uk**

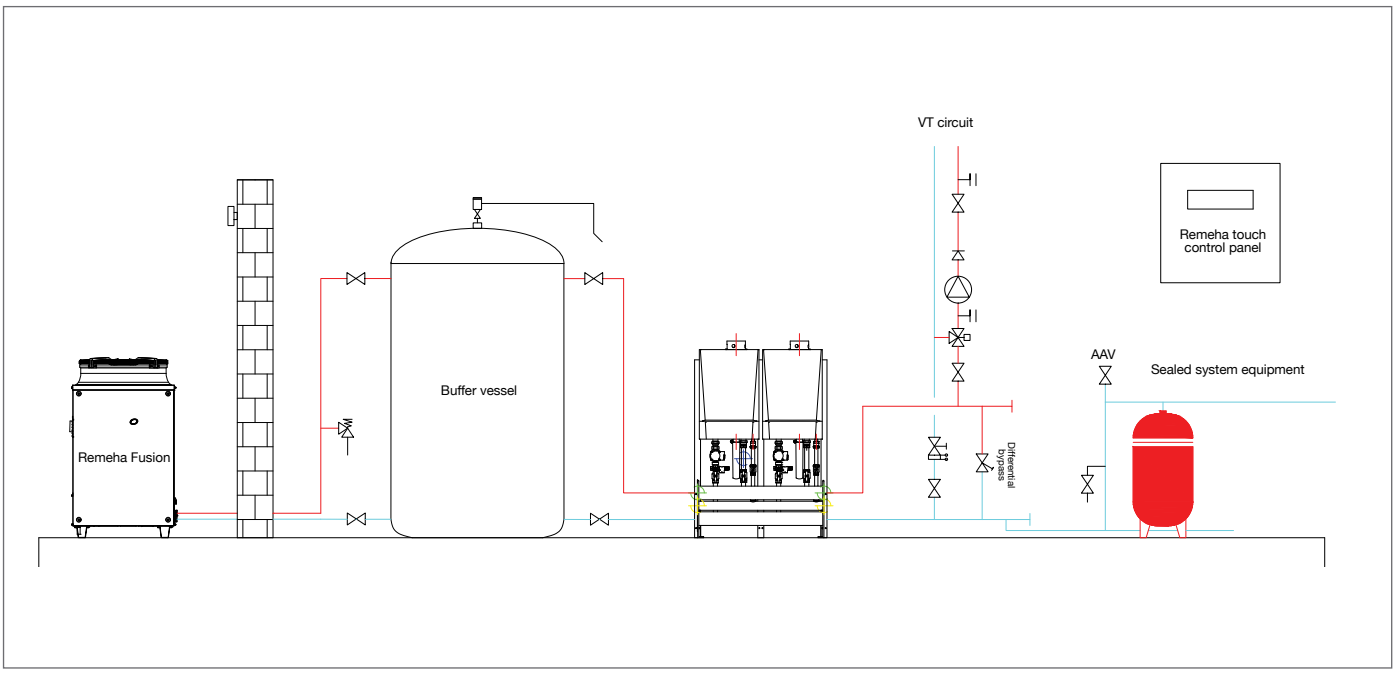
Dimensions
and connections.

Pipework connections

Key					
1	Gas connection (¾" F)	2	Return connection (1¼" F)	3	Flow connection (1¼" F)



Fusion hybrid principle drawings

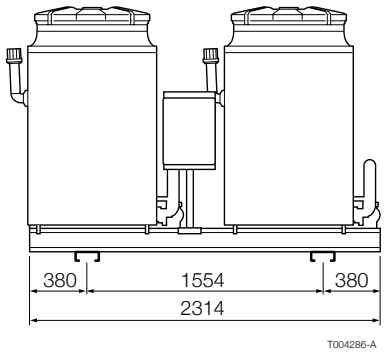


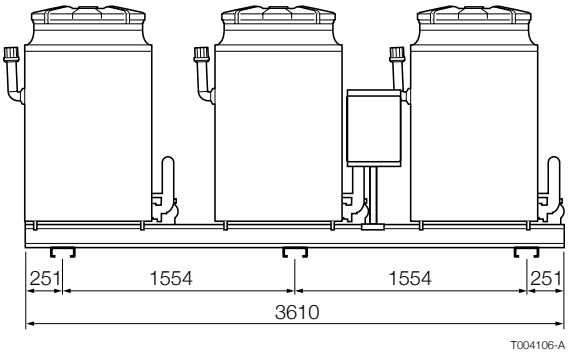
Fusion
technical information.

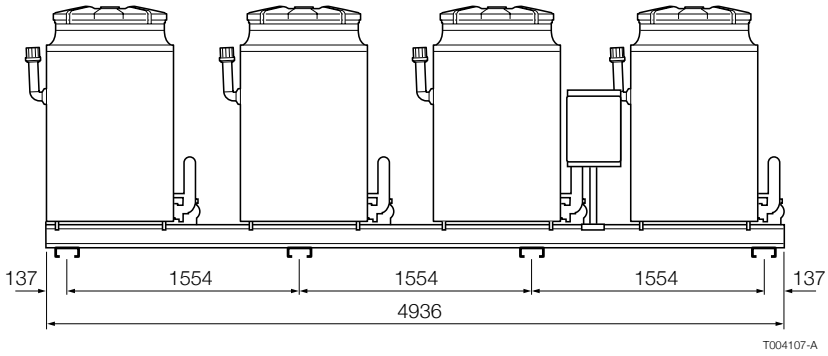
Installation Data	Unit	Data per cascade			
Number of Fusion GAHPs	**N**	**2**	**3**	**4**	**5**
Output (A7/W50)	kW	70	105	140	175
Load (Hi)	kW	51.4	77.1	102.8	128.5
Gas consumption (G20)	m^3/h	4.88	7.32	9.76	12.20
Nominal flow rate (ΔT 10K)	m^3/h	6	9	12	15
Residual pump pressure (ΔT 10K)	kPa	20	20	20	20
Water content	l	15.5	23.7	32.2	41.5
Supply voltage (voltage, type – frequency)	v	400v x 3 + N – 50hz	400v x 3 + N – 50hz	400v x 3 + N – 50hz	400v x 3 + N – 50hz
Max electricity consumption	W	2640	3960	5280	6600
Insulation class	IP	X5D	X5D	X5D	X5D
Gas connection Ø	inch	1½" M	1½" M	1½" M	1½" M
Water connection (flow/return) Ø	inch	2" M	2" M	2" M	2" M
Condensate drain Ø	inch	1" M	1" M	1" M	1" M
Noise levels (max) at 10m	dB(A)	50	52	53	54
Dimensions	(WxHxD) mm	2314 x 1245 x 1650	3610 x 1245 x 1650	4936 x 1245 x 1650	6490 x 1245 x 1650
Dry weight	kg	970	1425	1920	2395

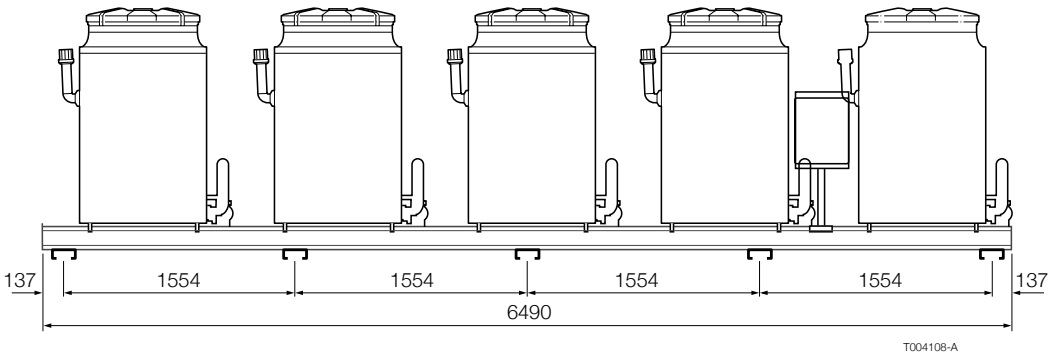
Fusion cascade
dimensions.

Main dimensions of cascade configuration with two, three, four and five heat pumps









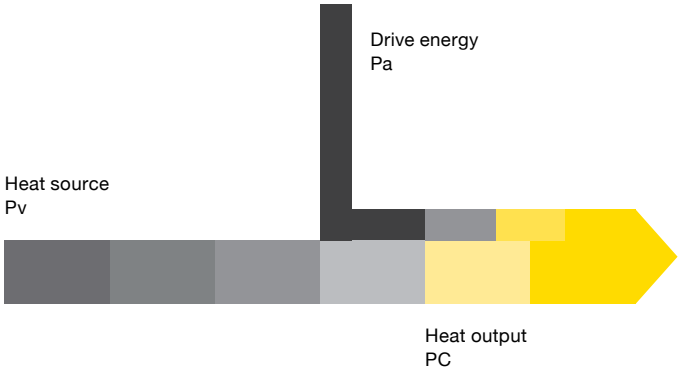

remeha
GAS HP 35A HT

The efficiency of heat pumps.

The efficiency of the various kinds of heat pumps is expressed in different units.

What is a heat pump?

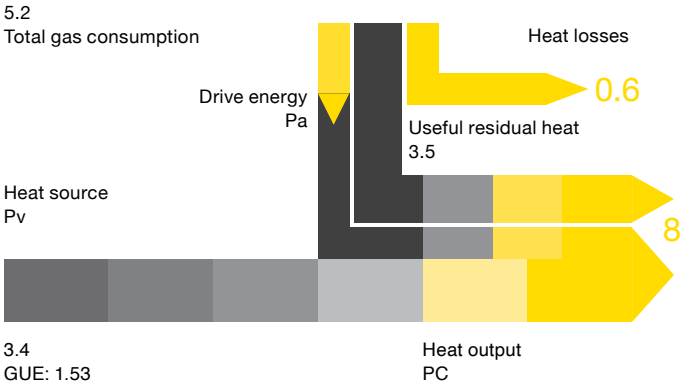
A heat pump is a device that transfers heat with the aid of a refrigeration circuit. To perform this action, the pump requires drive energy.



Gas Utilisation Efficiency (GUE)

The GUE (Gas Utilisation Efficiency) is another name for the PER (Primary Energy Ratio) and is used if gas is the primary energy source. The GUE is expressed as a minimum value.

Energy performance of gas absorption heat pump



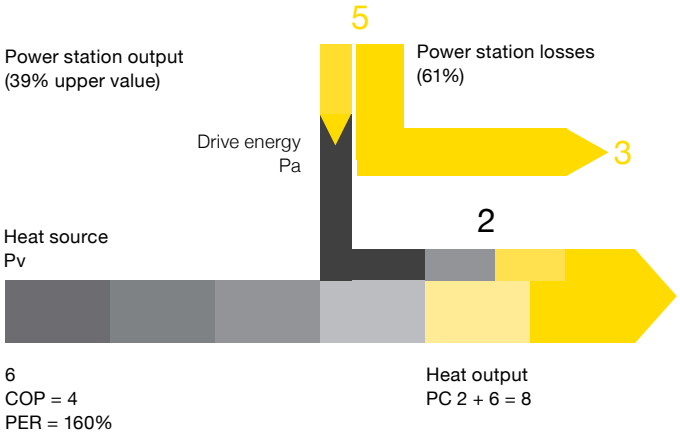
Primary Energy Ratio (PER)

If we take the average efficiency of power stations to be 45%, 2.23 primary energy units are required for one unit of electrical energy. This means that 2.23 primary energy (gas or coal) units are needed to supply four units of usable thermal energy. If the amount of useful energy is divided by the amount of primary energy, we get the PER. The PER is expressed as a maximum value. In our example, the PER is 1.8. The PER is a better measure for comparing the various heat pumps with each other.

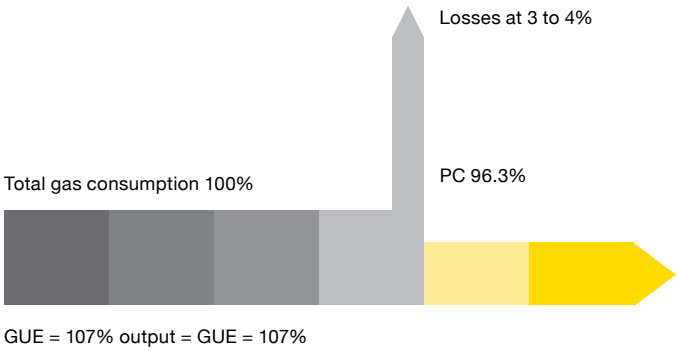
Coefficient Of Performance (COP)

The performance of an electric heat pump is mainly expressed in COP. The COP is calculated by dividing the amount of useful energy by the amount of electrical energy input. If an input of one unit of electrical energy is needed for four units of thermal energy to reach the required temperature, the COP is 4. The calculation does not take the efficiency of the electricity power station into account.

Energy performance of electric heat pump



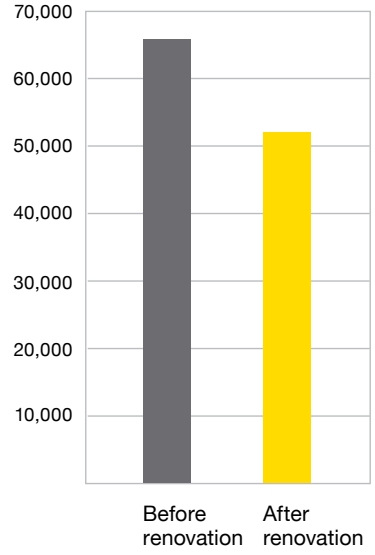
Energy performance of HR107 boilers (96.3% at upper value)



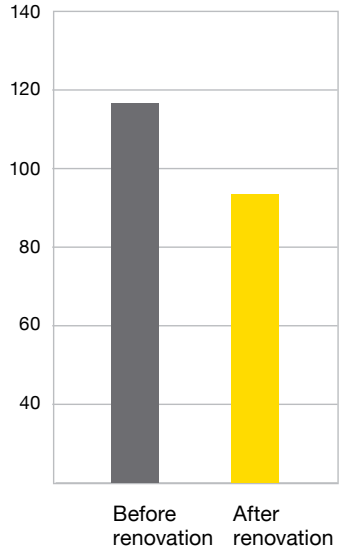
Reduce your
energy consumption.

Example calculation

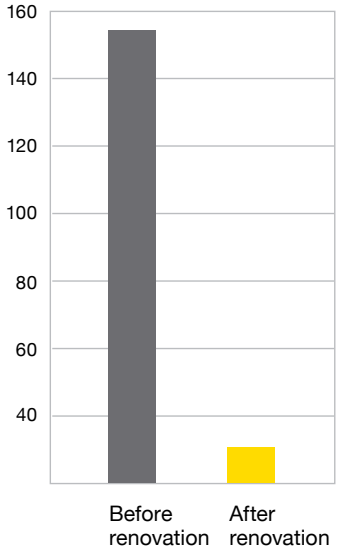
Average Gas Consumption (M^3/Year)



Average Co_2 emissions (tonnes/year)



Average No_x emissions (tonnes/year)



Current boilers
Two Gas 6, year of construction 1977

Proposed new boilers
One Gas 610 ECO PRO (two units) with one Fusion

Gas		Average savings
Consumption before renovation	61,358m^3/year	21%
Consumption after renovation	51,410m^3/year	13,948m^3/year
CO_2		
Emissions before renovation*	116 tonnes/year	20%
Emissions after renovation*	93 tonnes/year	23 tonnes/year
NO_x		
Emissions before renovation	152kg/year	80%
Emissions after renovation	31kg/year	121kg/year

*Calculated emissions include the additional electricity consumption required for a water pump.

Technical support and declaration of compliance.

Technical support

From brochures to CAD drawings and BIM files, you can access all the information you need at **remeha.co.uk**

Or call our sales or technical departments on **0345 070 1055.**

We're always happy to help.

We can provide you with:

- Brochures
- Technical specification sheets
- Case studies
- Installation manuals
- BIM files
- CAD files
- Energy-related products directive data
- Commissioning
- Technical information
- Spare parts (part of our sales service)

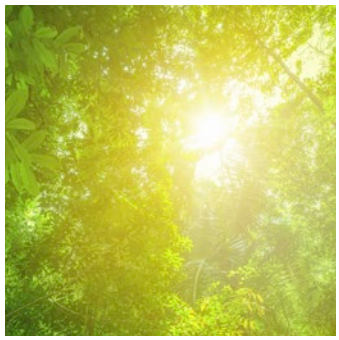
Declaration of compliance

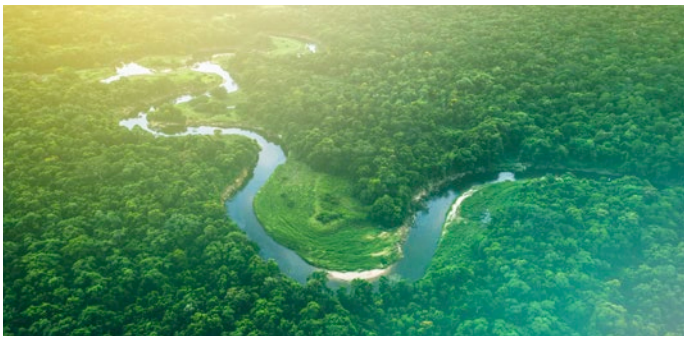
We hereby certify that the series of appliances specified is certified as conforming to standard EN 12309-1 and -2 and that it is manufactured and marketed in compliance with the requirements and standards of the following European Directives:

- 2016/426 EU Gas Appliance Regulations
- 92/42/EEC Efficiency Directive
- 89/336/EEC EMC Directive

And complies with the following requirements:

- 89/336/EEC Low Voltage Directive
- 2006/42/EC Machinery Directive
- 97/23/EEC Pressurised Equipment Directive
- UNI EN 677 Specific requirements for condensing boilers with nominal thermal capacity up to 70kW
- EN 378 Refrigerating systems and heat pumps
- ErP compliant





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Fusion Specification Guide October 2021