GWPL 38
Gas absorption heat pump 38.3kW

A low carbon solution for commercial heating and hot water

Intelligent Heating Solutions

Buderus
Bosch Group

Discover Buderus...

Buderus is one of the world's leading manufacturers of heating products with a heritage stretching back over 275 years. In the UK the brand is part of Bosch Thermotechnology Ltd. and specialises in providing complete system solutions for the commercial and industrial heating sectors with individual outputs from 43kW to 19.2MW.

Buderus headquarters in Wetzlar, Germany

All Buderus products are subject to rigorous quality testing of each and every component, to ensure efficient, reliable and consistent performance throughout a long life. These products are supported by an unrivalled technical support team which is able to help with system design, product specification and installation issues. This ensures our system technology is perfectly matched to meet the precise requirements of each project. From initial consultation to final commissioning and on-going, whole-life support, Buderus offers the complete package. Added peace of mind comes from being part the world renowned Bosch Group, aided by secure guarantees and 10 year spares availability.

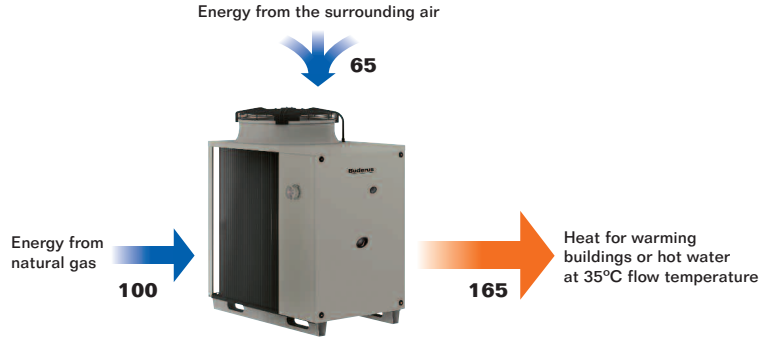
In the UK Buderus is part of Bosch Thermotechnology Ltd, a company at the forefront of heating and hot water technology. The company has a diverse portfolio of heating products, backed by strong commitment to the development of sustainable heating technology solutions for the future.

GWPL 38 Gas absorption heat pump

High efficiency commercial heating with a lower carbon footprint

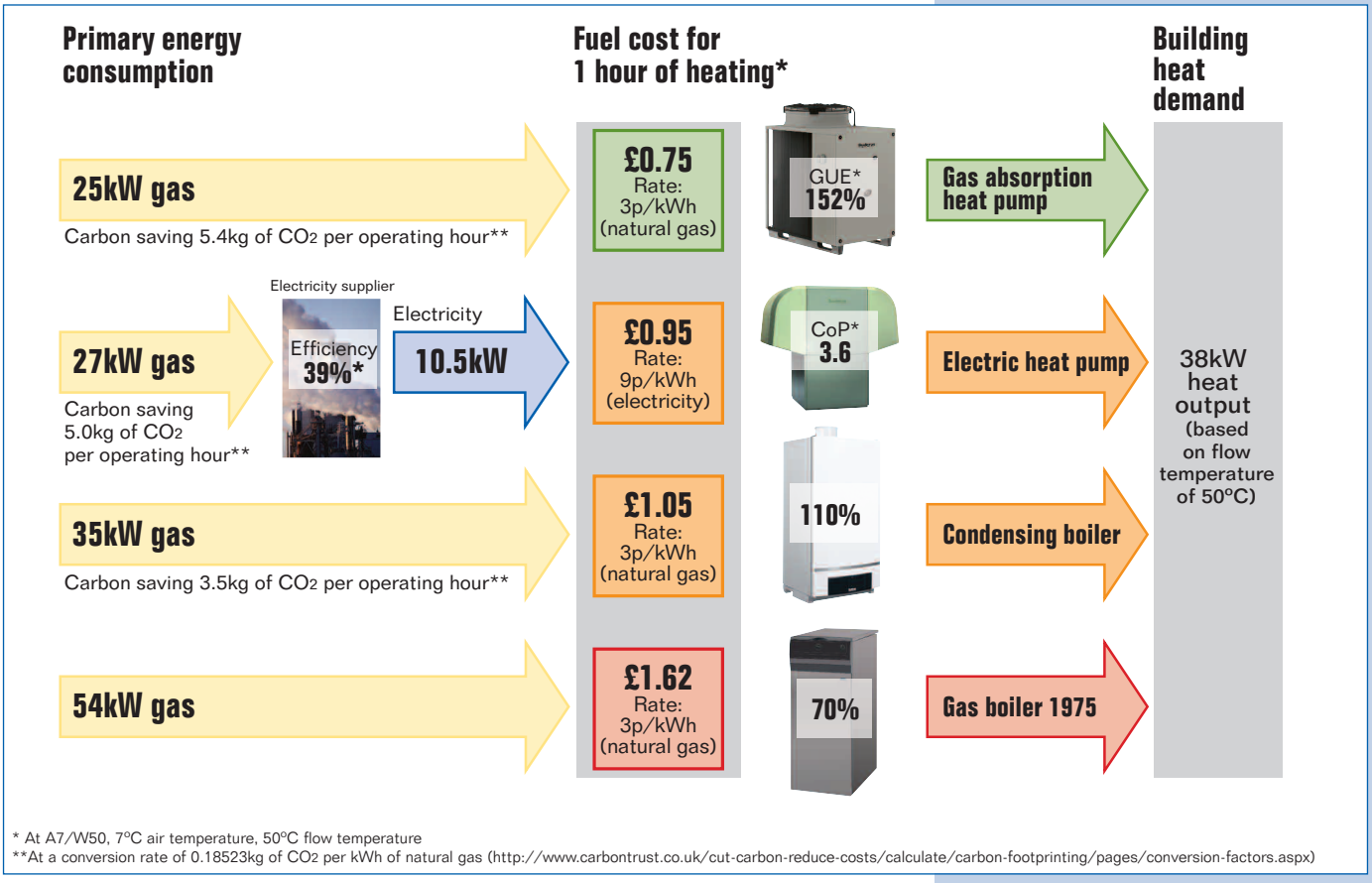
Buderus GWPL low-carbon gas absorption heat pumps deliver highly efficient, renewable heating solutions for commercial, industrial and residential applications.

The gas absorption heat pump draws energy from the air using heat pump technology and a highly efficient, gas condensing burner. By using gas as the primary energy source directly at the point of use, rather than electricity which is generated largely in coal or gas fired power stations, the gas absorption heat pump has a significantly smaller carbon footprint.



Gas absorption heat pumps also cut running costs because gas is typically only a third of the price of electricity and the heat pump provides up to 65% additional heat by drawing in free energy from the surrounding air.

As such, they also deliver reduced energy consumption and carbon emissions compared to conventional methods of providing heat to buildings.



* At A7/W50, 7°C air temperature, 50°C flow temperature
**At a conversion rate of 0.18523kg of CO_2 per kWh of natural gas (http://www.carbontrust.co.uk/cut-carbon-reduce-costs/calculate/carbon-footprinting/pages/conversion-factors.aspx)

Typical applications for the GWPL 38

The GWPL 38 is the perfect choice for new buildings or in existing buildings as a stand alone solution or combined with a conventional boiler. It is ideal for schools, colleges, office developments, care homes, residential properties, leisure and sports facilities as well as process heat applications.

New build

As a renewable technology with NOx emissions qualifying for BREEAM 5, using a Buderus gas absorption heat pump helps achieve targets for renewable technologies required for planning permission, without high installation or operating costs. As the units are designed for external installation there is no requirement to use valuable space for plant rooms, flue gas systems or bulky fuel storage. With the opportunity to design low temperature heating systems in a new building, the maximum benefit of the gas absorption heat pump can be realised.

Replacement/refurbishment

Adds value to a building by reducing the running costs and improving the building's energy rating through Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs).

As a low carbon technology a Buderus gas absorption heat pump offers high efficiencies and carbon saving even when operating in typical systems operating at higher temperatures. It achieves a maximum flow temperature of up to 65°C for heating and a flow temperature of up to 70°C for the production of domestic hot water. This allows the heating plant to be updated without having to upgrade the pipe work and heat emitters throughout the building. These benefits are achieved without incurring high operating or maintenance costs.

Integration with existing systems

Gas absorption heat pumps are just as easy to integrate into a heating system as a condensing boiler, with the additional benefits of higher carbon savings, lower environmental impact and reduced running costs. They can be supplied as pre-fabricated cascades of up to 5 units and integrated with other heat sources such as solar thermal and boilers.

Thanks to their low carbon emissions, gas absorption heat pumps also make a major contribution to compliance with legislation and energy targets:

- Building Regulations Part L
- CRC EES
  (Carbon Reduction Commitment – Energy Efficient Scheme)
- EEI (Energy Efficiency Indicator)
- EPC (Energy Performance Certificate)
- DEC (Display Energy Certificate)
- BREEAM/LEED ratings

High efficiency at all temperature ranges

Gas absorption heat pumps can achieve higher system temperatures and remain efficient even in winter temperatures.

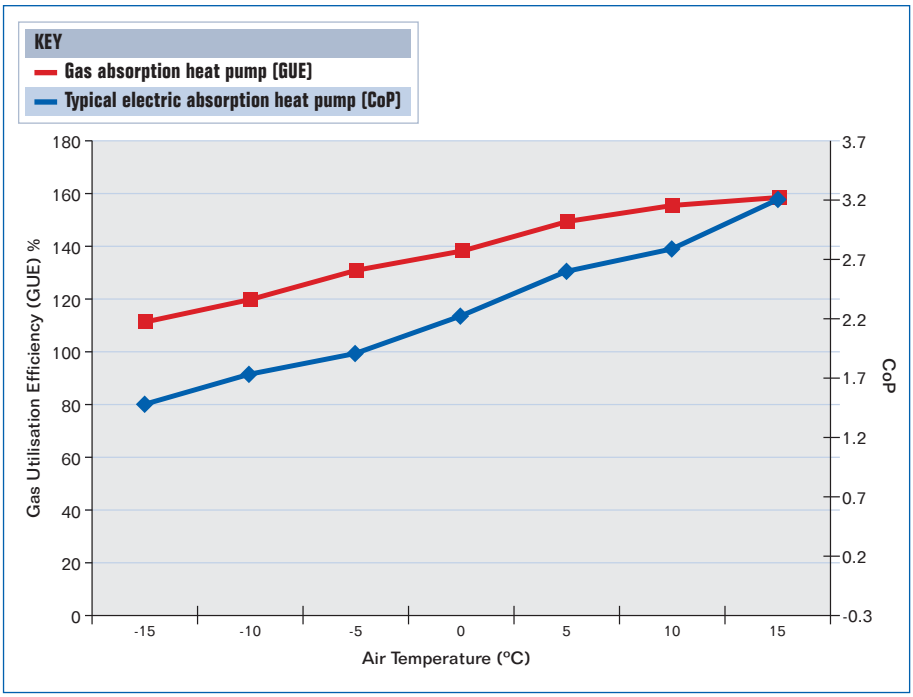
The air around us stores solar energy even when the thermometer shows a negative temperature measured in celsius. In the UK, the average temperatures in the peak heating period (October to March) are 7°C, allowing the heat pump to absorb on average 0.5kW of free energy for every 1kW of gas consumed during these cold periods. Even when temperatures are as low as -7°C, the gas absorption heat pump works with an efficiency of 125% in a heating system running at 50°C, and 143% in a system designed to operate at lower temperatures of 35°C.

Comparing heat pump performance

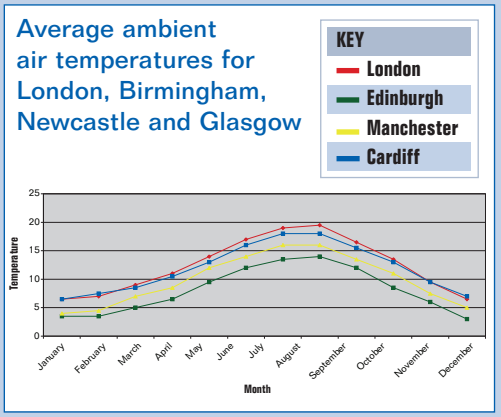
The Coefficient of Performance (CoP) of an electric heat pump is higher than the efficiency stated for the gas heat pump which is stated as Gas Utilisation Efficiency (GUE) – however this does not mean that electric heat pumps are more efficient.

The CoPs stated for electric heat pumps often relate to low temperature heating systems and higher air temperatures. In more typical heating systems operating at higher system temperatures in the winter, efficiency rapidly drops off.

The electricity used has typically been generated in the UK from coal or gas fired power stations and then distributed over long distances. This means that, typically, less than 40% of the primary energy actually reaches the electric heat pump. The high cost of generating and distributing electricity is reflected in the price which is typically three times more expensive than gas.



Average ambient air temperatures for London, Birmingham, Newcastle and Glasgow



The gas absorption heat pump retains its efficiency even when temperatures are lower.

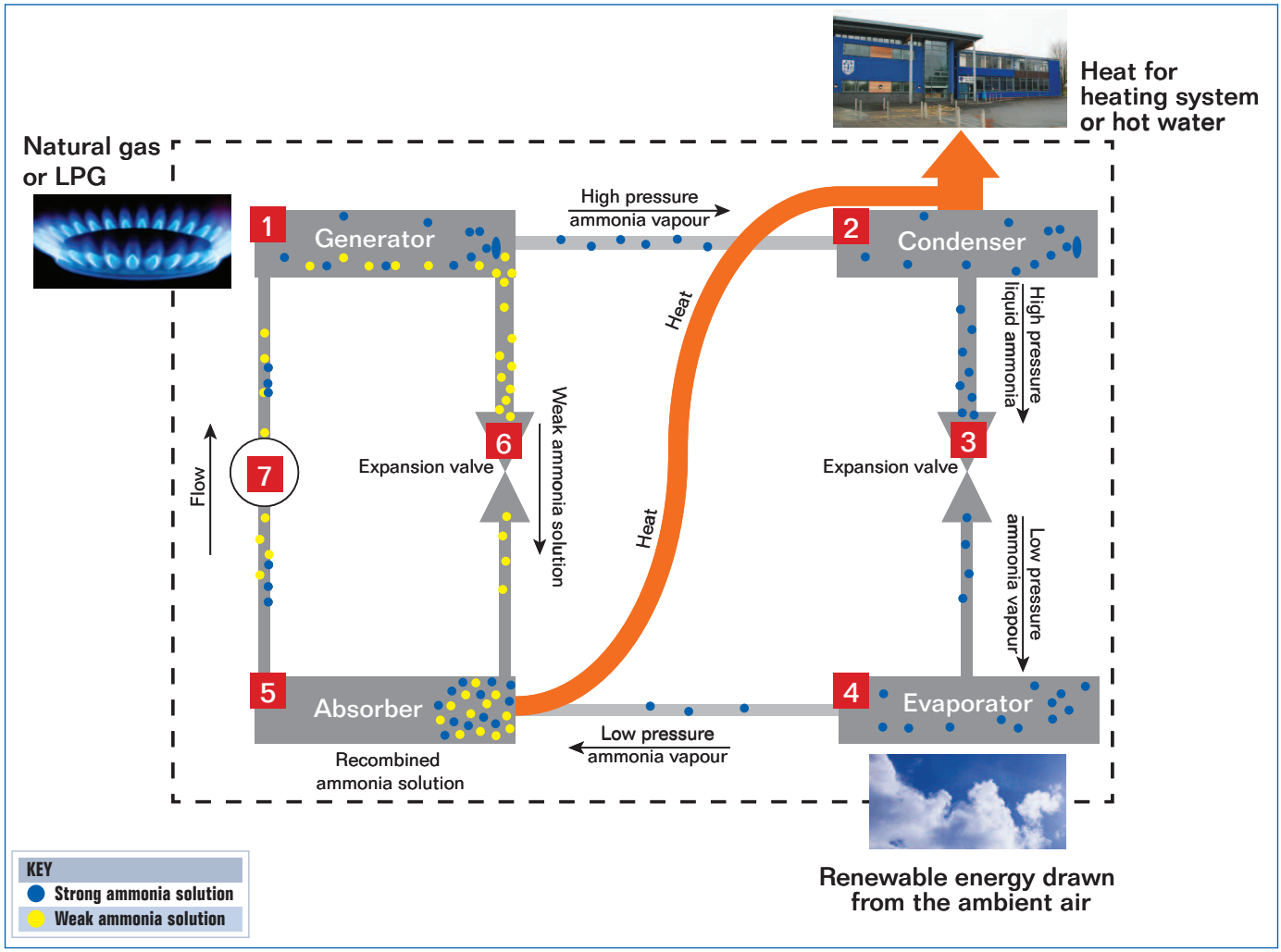
How gas absorption heat pumps work

Like their electric counterparts, gas absorption heat pumps are able to extract heat from the air. However, unlike electric heat pumps there is no requirement for an electrical compressor. Instead, the system uses a generator-absorber heat exchange cycle powered by natural gas or LPG.

All heat pumps use the refrigeration cycle and in gas absorption heat pumps the working fluid is an ammonia/water solution. The ammonia acts as the refrigerant and the water acts as an absorber. The components of a gas absorption heat pump include an evaporator, a generator, an absorber/regenerator and a condenser/absorber.

Zero global warming

The ammonia refrigerant used in the GWPL 38 has zero global warming potential (GWP) and zero ozone depletion potential (ODP). In contrast, the fluorinated refrigerants typically used in electric heat pumps have significant GWP.



1 Generator

Within the Generator the low NOx gas-fired burner heats the ammonia/water solution via a heat exchanger, increasing the temperature and pressure. This causes it to separate into a strong ammonia vapour and a weak ammonia solution. The strong ammonia vapour travels to the Condenser (2) whilst the weak ammonia solution is circulated to the Absorber (5).

2 Condenser

The now high temperature, high pressure ammonia vapour releases its heat into the heating system in the condenser. In doing so, the vapour changes state becoming a liquid. This liquid travels to the expansion valve (3) on its way to the Evaporator (4).

3 Expansion valve

The ammonia liquid, still at high pressure, passes through the expansion valve where the pressure falls. At this low pressure, ammonia has a reduced boiling point and the liquid changes back to a vapour. This vapour passes on to the Evaporator (4).

4 Evaporator

A fan draws ambient air through the fins of the Evaporator. The ambient air contains a high amount of free, renewable energy from the air. This energy is captured by the ammonia vapour. The now heated, low pressure vapour passes on to the Absorber (5).

5 Absorber

In the absorber the weak ammonia solution from the Generator (1) recombines with the heated vapour from the Evaporator (4), having first passed through a second expansion valve (6). As the vapour and weak ammonia solution recombine, the vapour changes state into a liquid, releasing further heat to the heating system. The now recombined ammonia solution is pumped (7) back to the generator.

6 Second expansion valve

As described above, this second valve controls the flow of weak ammonia between the Generator (1) and the Absorber (5).

7 Pump

The pump moves the ammonia solution from the Absorber (5) back to the Generator (1) where the process starts again.

The GWPL 38 is technology at its best – full of innovative, yet practical features.

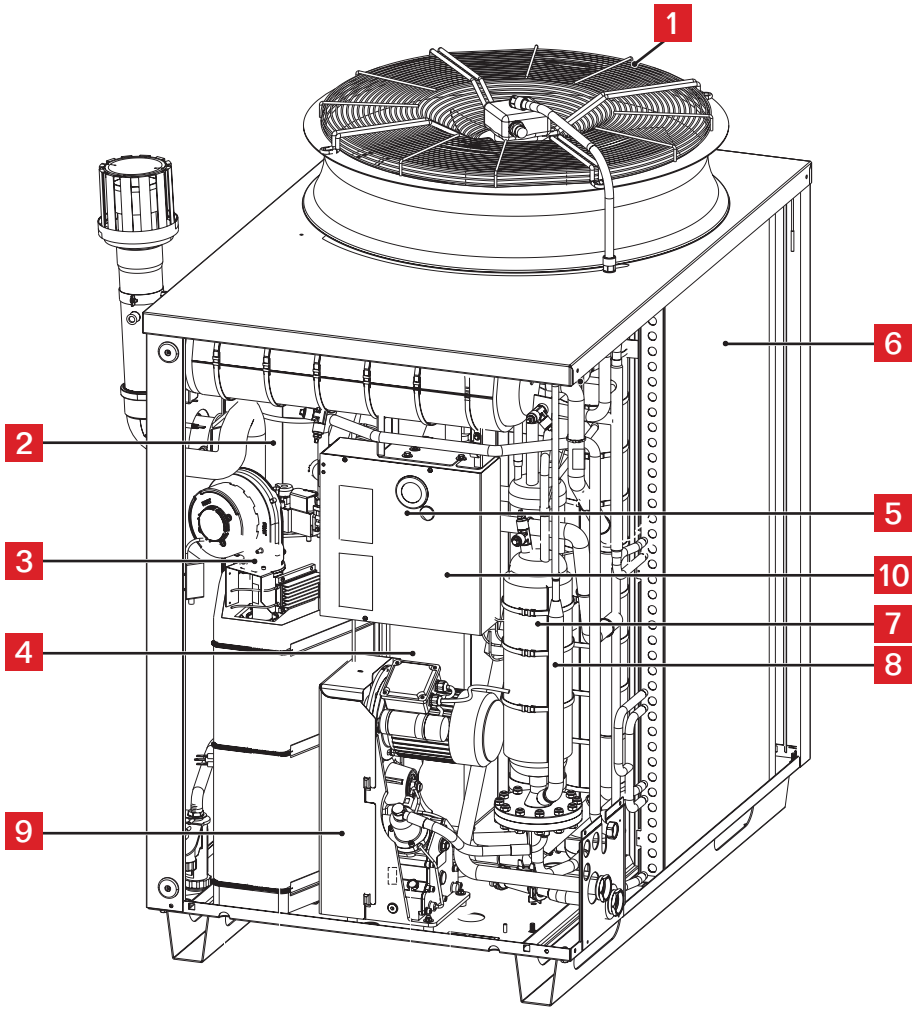
Additional cost of ownership benefits

Gas absorption heat pumps also offer a number of additional benefits over other heating systems, as summarised below.

- Suitable for outdoor installation, no need for a plant room
- No requirement for a chimney as flues are included
- Reduced energy costs
- Reduced requirements to purchase carbon allowances for those organisations participating in the CRC EES
- Low maintenance requirements
- Fast return on investment
- Zero GWP provides BREEAM credits
- Lack of chlorinated refrigerant satisfies LEED ratings
- Improved Building Energy Certificate rating
- Low electric power requirement reduces reliance on local electricity supply infrastructure

GWPL 38
Technical data

GWPL 38 single unit
Gas absorption heat pump components.



1 Fan
2 Generator
3 Gas burner
4 Condenser
5 Expansion valve (hidden)
6 Evaporator
7 Absorber (hidden)
8 Second expansion valve (hidden)
9 Pump
10 Controller

GWPL gas absorption heat pumps require additional system components such as circulation pumps and expansion vessels.

Product Overview

GWPL 38 at a glance:
- Efficiency (Gas Utilisation Efficiency): 164%*
- Output single unit: 41.1kW*
- Output cascade with two units: 82.2kW*
- Output cascade with three units: 123.3kW*
- Output cascade with four units: 164.4kW*
- Output cascade with five units: 205.5kW*
- NOx emissions: <25ppm (BREEAM 5)
- Maximum flow temperature for heating: 65°C
- Maximum flow temperature for DHW: 70°C
- For installation outside on a flat roof or at ground level
- Sound level single unit (at 1m/10m:65/45dB(A))
- Max. gas consumption: 2.72m^3/h
- Electricity consumption single unit: 1.09kW
- Control interfaces with BMS: Volt free enable signal or 0 - 10V variable temperature set point
- Sequence controls available for cascade kits: up to 16 GWPL 38
- Operating weight (single unit): 400kg

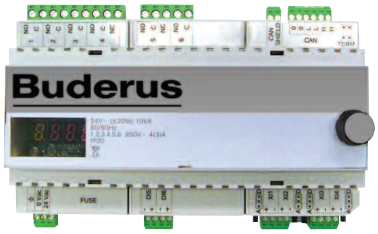
*These figures are given at A7W35. This means that the efficiencies and outputs are achieved at an ambient temperature of 7°C, while producing a water flow temperature of 35°C. For other temperatures see the full data table at the end of this brochure.

GWPL 38 controls

The Buderus GWPL 38 is designed for properties where the heating system is controlled by a Building Management Systems (BMS). The BMS will communicate the required heat input to the GWPL control using a 0-10V or volt free enable signal and there is an output for operational status. The GWPL control system ensures the efficient, reliable and safe operation of the heat pumps and will be provided as part of the supplied system. It also provides information required for maintenance and service.

The supplied GWPL control system is made up of two main parts: the programming and sequencing unit (GHMC20) and the BMS interface module (GHMC20T). Both of these should be installed in an electrical switch cabinet, ideally close to the BMS. This allows access to the controls for monitoring without having to access the heat pumps which will be installed externally.

GHMC20



GHMC20T

The programming and sequencing unit, GHMC20, controls systems with up to sixteen heat pumps, regardless of how these are configured. The controller will automatically recognise all connected heat pumps and communicates with them using CAN-bus. Where the BMS cannot provide weather compensated control, the GHMC20, fitted with the optional sensor, can provide this to further improve operating efficiency.

The BMS interface module, GHMC20T, manages communication between the GHMC20 and the buildings BMS. It provides separate inputs from the BMS for heating and hot water from the BMS allowing either prioritisation of heating or hot water or for both to operate in parallel.

Further technical details, including wiring diagrams and specification of additional parts of the heating system are available online or in the printed planning guide.

Further accessories available

There is a range of accessories designed to be used with the Buderus GWPL 38 heat pump. These accessories will be offered as appropriate to each project.

- Outside air temperature sensor for GHMC20
- Anti vibration mounts for single appliances and cascade systems
- Primary pumps for use on single heat pump installations
- LPG conversion kit for on-site conversion of each unit
- Hydraulic lubricating oil for oil pump

GWPL 38
Technical data

PERFORMANCE		Air (A) °C	Flow temp (W) °C	Unit	GWPL 38	GWPL 38 L2 x 2 cascades	GWPL 38 L3 x 3 cascades	GWPL 38 L4 x 4 cascades	GWPL 38 L5 x 5 cascades
Maximum rated heating output	A7W35	7	35	kW	41.1	82.2	123.3	164.4	205.5
Maximum rated heating output	A7W50	7	50	kW	38.3	76.6	114.9	153.2	191.5
Maximum rated heating output	A7W65	7	65	kW	30	60	90	120	149.9
Maximum rated heating output	A0W50	0	50	kW	35.1	70.2	105.3	140.4	175.5
Maximum rated heating output	A-7W50	-7	50	kW	31.5	63	94.5	126	157.5
Maximum rated heat input up to a flow temperature of 65°C				kW	25.7	51.4	77.1	102.8	128.5
EFFICIENCY									
Efficiency	A7W35	7	35	%	164	164	164	164	164
Efficiency	A7W50	7	50	%	152	152	152	152	152
Efficiency	A7W65	7	65	%	119	119	119	119	119
Efficiency	A0W50	0	50	%	139	139	139	139	139
Efficiency	A-7W50	-7	50	%	125	125	125	125	125
GENERAL DATA									
Voltage (single phase)				AC ... V	230	400	400	400	400
EMC limit class				-	B	B	B	B	B
Appliance enclosure rating				IP	X5D	X5D	X5D	X5D	X5D
Frequency				Hz	50	50	50	50	50
Power consumption as delivered				W	1090 ± 10 %	2820 ± 10 %	4230 ± 10 %	5640 ± 10 %	7050 ± 10 %
Maximum power consumption (central heating mode)				W	1200	3040	4560	6080	7600
Maximum power consumption (stand-by)				W	10	25	35	45	55
Sound pressure level 10 m				dB(A)	45	45.8	47.5	48.4	49.2
Sound pressure level 1 m				dB(A)	65	66.8	70.3	72.2	74
Maximum DHW flow temperature				°C	70	70	70	70	70
Maximum heating water flow temperature				°C	65	65	65	65	65
Maximum DHW return temperature				°C	60	60	60	60	60
Maximum heating water return temperature				°C	55	55	55	55	55
Minimum return temperature				°C	2	2	2	2	2
Maximum flow rate	per appliance			l/h	4000	4000	4000	4000	4000
Minimum flow rate	per appliance			l/h	1000	1000	1000	1000	1000
Nominal flow rate	per appliance			l/h	3000	3000	3000	3000	3000
Temperature differential between flow and return				°C	10	10	10	10	10
Maximum operating pressure heating circuit				bar	4	4	4	4	4
Nominal heating water pressure drop (A7W50)	At ΔT 10K			bar	0.43	0.51	0.51	0.51	0.51
Permissible ambient temperature				°C	-20 ... +45	-20 ... +45	-20 ... +45	-20 ... +45	-20 ... +45
Nominal capacity (heating water)				l	4	18.6	28.6	38.6	49.8
Weight (excluding packaging)				kg	395	970	1435	1920	2395
Weight (operating status)				kg	400	989	1464	1959	2445
GAS SUPPLY RATE									
Natural gas				m3/h	2.72	5.44	8.16	10.88	13.60
LPG				kg/h	2.00	4.00	6.00	8.00	10.00
PERMISSIBLE GAS SUPPLY PRESSURE									
Natural gas				mbar	17 - 25	17 - 25	17 - 25	17 - 25	17 - 25
LPG				mbar	45 - 55	45 - 55	45 - 55	45 - 55	45 - 55
FLUE DATA									
Flue gas mass flow rate at maximum rated heating output	Natural Gas				12.5	25	37.5	50	62.5
Flue gas mass flow rate at maximum rated heating output	LPG			g/s	11.7	23.4	35.1	46.8	58.5
Flue gas temperature 50/40 °C at maximum rated heating output				°C	65	65	65	65	65
CO_2 at maximum rated output	Natural Gas			%	9.2	9.2	9.2	9.2	9.2
CO_2 at maximum rated output	LPG			%	9.8	9.8	9.8	9.8	9.8
CO_2 at minimum rated output	Natural Gas			%	8.6	8.6	8.6	8.6	8.6
CO_2 at minimum rated output	LPG			%	9.4	9.4	9.4	9.4	9.4
CO				ppm	36	36	36	36	36
NOx class				-	5	5	5	5	5
NOx				ppm	25	25	25	25	25
Flue diameter				mm	80	80	80	80	80
CONDENSATE									
Maximum condensate flow rate (TR = 30°C)				l/h	4	8	12	16	20
pH level, approx.				-	4.8	4.8	4.8	4.8	4.8
DATA AS PER PRESSURE EQUIPMENT DIRECTIVE (PED)									
Generator capacity				l	18.6	18.6	18.6	18.6	18.6
Refrigerant drier capacity				l	11.5	11.5	11.5	11.5	11.5
Intermediate refrigerant store capacity				l	4.5	4.5	4.5	4.5	4.5
Pre-absorber capacity				l	6.3	6.3	6.3	6.3	6.3
Absorber/condenser capacity				l	3.7	3.7	3.7	3.7	3.7
Oil pump capacity				l	3.3	3.3	3.3	3.3	3.3
Test pressure (air)				bar (g)	55	55	55	55	55
Safety valve response pressure				bar (g)	35	35	35	35	35
Refrigerant proportion				kg NH3/l	0.146	0.146	0.146	0.146	0.146
Fluid category				-	1	1	1	1	1
Maximum operating pressure in refrigerant circuit				bar	35	35	35	35	35
Refrigerant ammonia R717/water				kg	7/10	7/10	7/10	7/10	7/10

Multiple heat pump cascade systems

For higher heat demands, the GWPL 38 can be supplied in a factory-assembled, rig-mounted multi-heat pump cascade system, pre-configured with flow, return and gas manifold. Each unit has its own primary circulation pump to provide optimum flow rates and efficient operation.

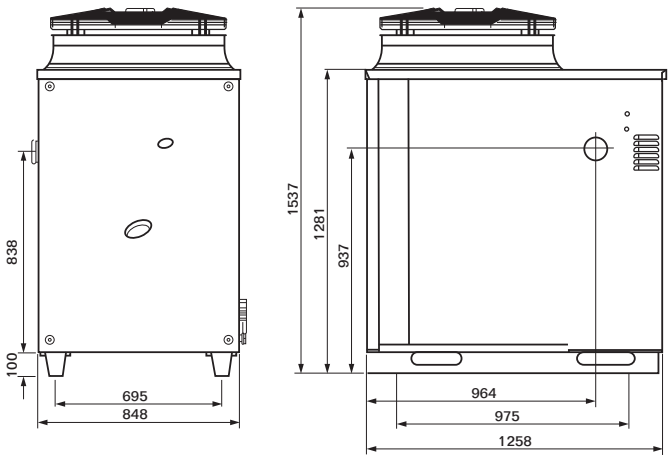
Connected in-line, cascades provide outputs up to 205.5kW for five units, and larger cascade systems are available if required.

A pre-set cascade controller ensures that high levels of efficiency can be achieved all year round, even when demand for heat is low.

1. Individual flue gas systems.
2. Main electrical cabinet for outdoor conditions to which every unit is electrically connected. The product documentation is sited here.
3. Pre-configured GHMC20 controller for sequencing is delivered inside the controller and has to be fitted into an electrical wiring cabinet.
4. Wilo Top-S 30/10 single stage primary pumps (one per unit).
5. Stainless steel hydraulic manifolds, they are insulated and protected with aluminium panelling for outdoor conditions.
6. Galvanised steel gas header pipe.
7. Condensate drain pipe is protected from freezing by the use of a trace heating cable (15W/m) controlled by a thermostat.

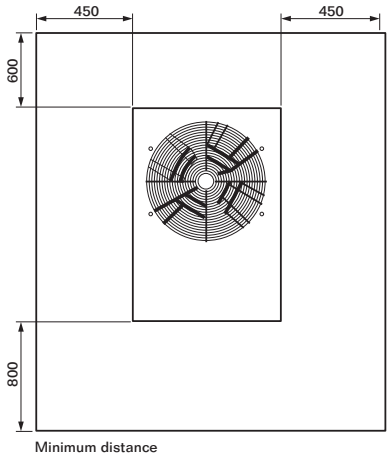
GWPL 38
Dimensions and clearances

Dimensions



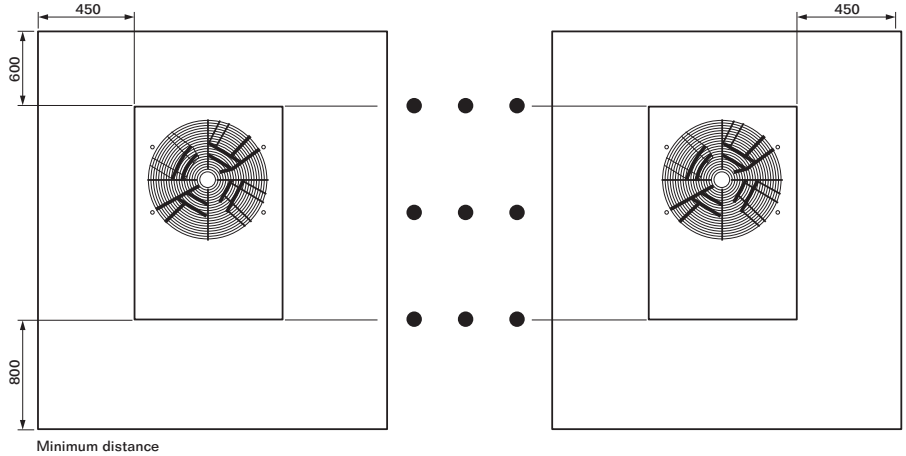
Clearances

GWPL 38 single unit



Minimum distance

GWPL 38 cascade



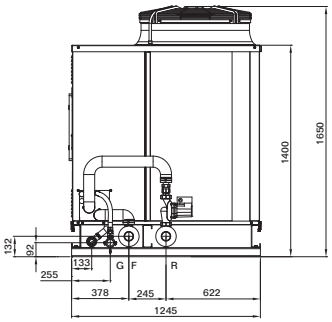
Minimum distance

Flexible system solutions

GWPL 38 cascade with 2 units

KEY	
G	Gas supply
F	Flow
R	Return

Side



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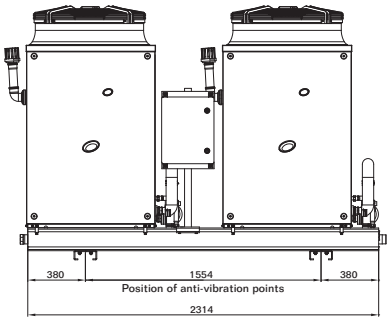
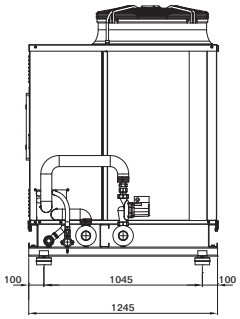


Side
(equipped with anti vibration pads)



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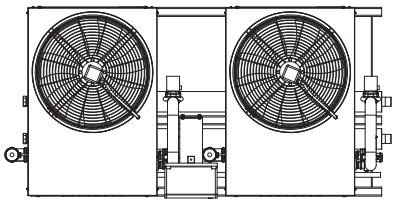
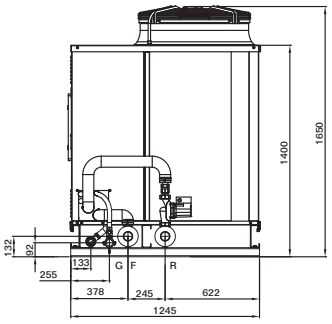


GWPL 38 cascade with 3 units

KEY	
G	Gas supply
F	Flow
R	Return

Side



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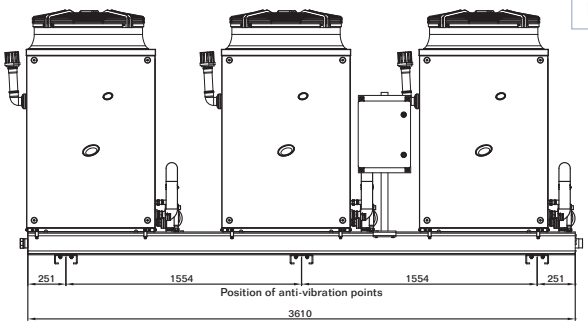
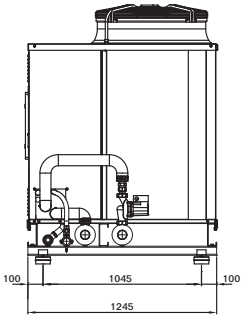


Side
(equipped with anti vibration pads)



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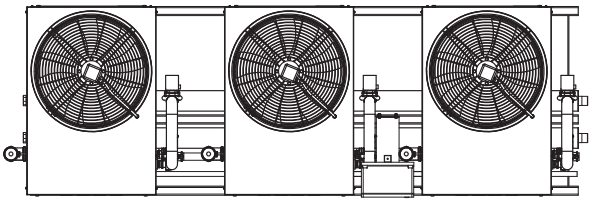
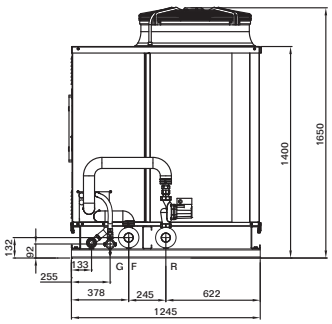


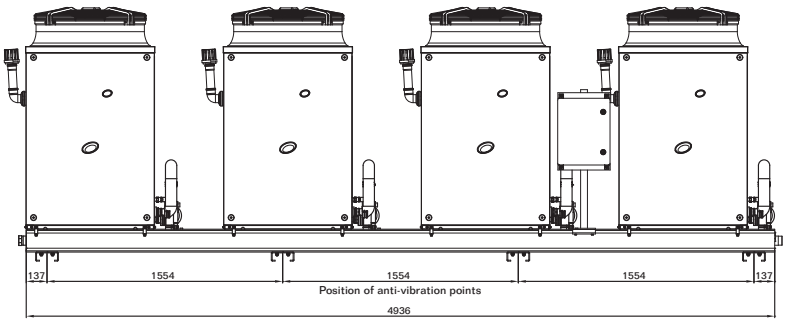
GWPL 38 cascade with 4 units

KEY	
G	Gas supply
F	Flow
R	Return

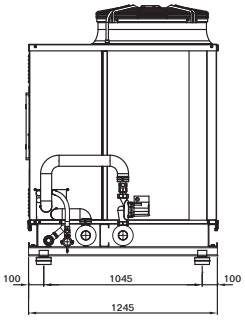
Side



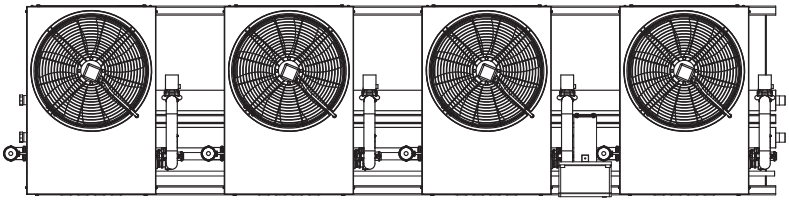
Front



Side (equipped with anti vibration pads)



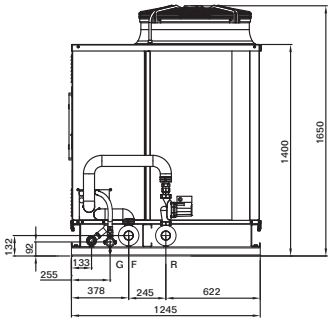
Top



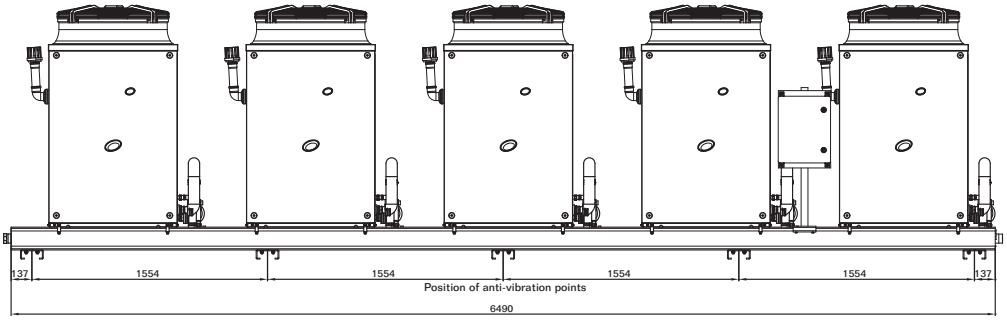
GWPL 38 cascade with 5 units

KEY	
G	Gas supply
F	Flow
R	Return

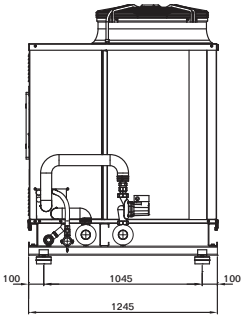
Side



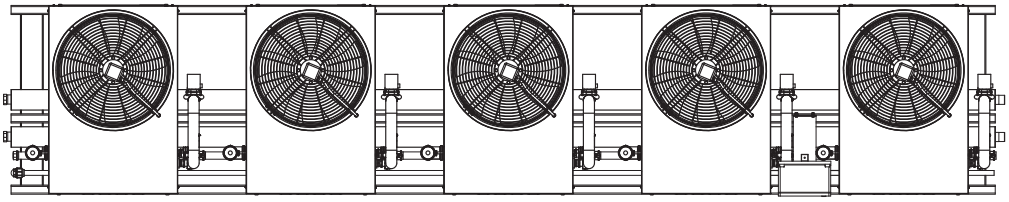
Front



Side (equipped with anti vibration pads)

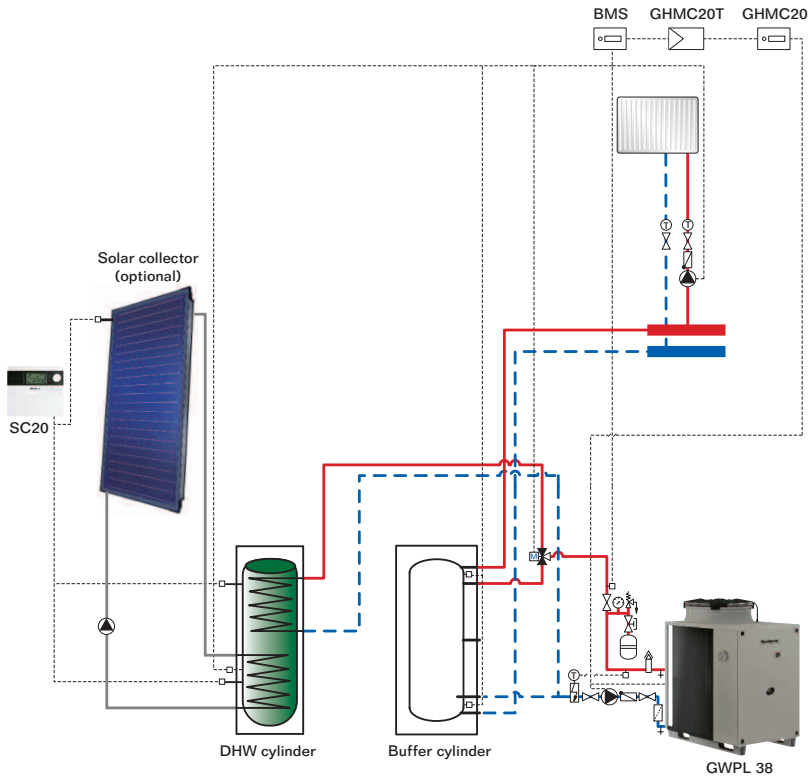


Top

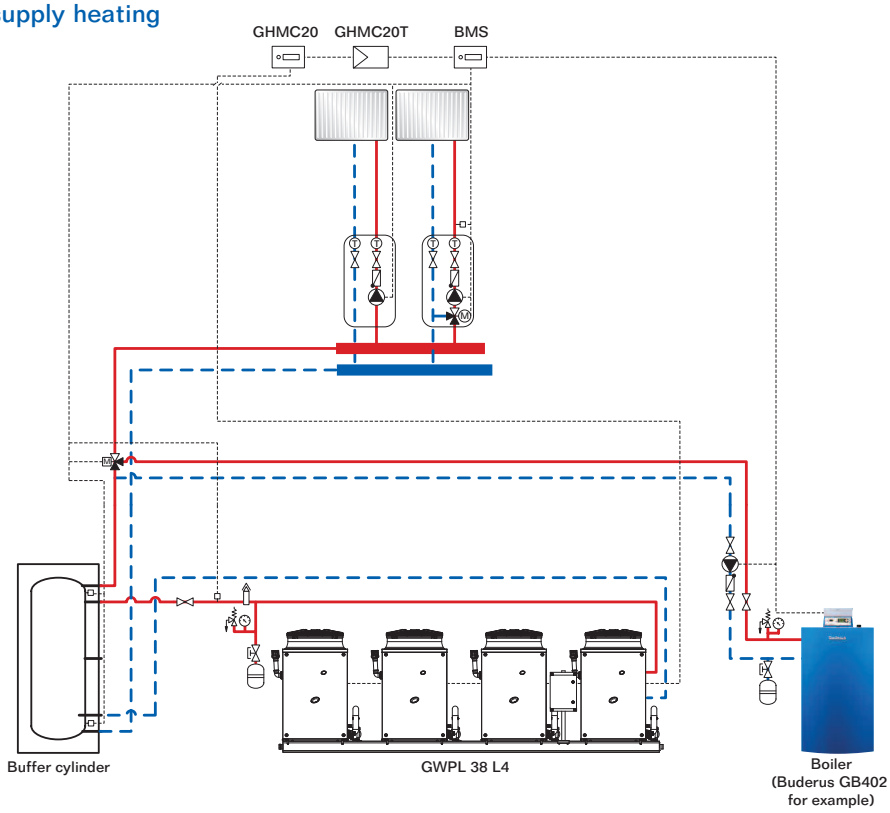


System schematics

Installation with a single GWPL 38 supplying heating and domestic hot water. The domestic hot water is supported by a solar thermal system.



Cascade of GWPL 38 working together with a condensing boiler to supply heating



- Temperature sensor
- Isolating valve
- Lockshield valve
- Expansion vessel
- Air separator
- Non-return valve
- Drain valve
- Diverter or mixing valve
- Pump
- Temperature gauge
- Pressure release valve

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