

PRESSURISATION RANGE PRESSURE TOP UP UNITS AND DEGASSERS



Grundfos Pressurisation and Separation Equipment

The demand for having the most efficient circulation systems is steadily increasing and at Grundfos we are always striving to provide products and solutions that exceed our customers' expectations. Grundfos' advanced technological pumping systems and solutions reduce energy consumption and at the same time provide businesses with real economic savings and CO₂ reductions.

Our new pressurisation and separation equipment will provide solutions to improve the overall performance and efficiency of heating and cooling installations. The key benefits of these products are to ensure that the fluid in the system is free from air and debris and that pressure is maintained, ensuring that the system runs at maximum efficiency. Our equipment improves reliability, saves energy, reduces maintenance costs and extends the life of the system.

Pressurisation

There are a number of advantages of using a more modern closed heating/chilling system as opposed to a traditional open system with a feed and expansion tank. The water used in sealed systems is constantly being reused, as a result the dissolved air is taken care of and exposed steel in traditional vessels is not subject to continued corrosion. Closed systems also do not require heavy roof top tanks and the associated pipework; therefore water loss due to evaporation is greatly reduced.

Closed systems reduce installation cost. Their higher flow temperatures and greater temperature drops reduce the systems water circulation needs, enabling a smaller pump and pipes to be used. This combined with replacing the conventional header tank, associated pipework and lagging, leads to considerable savings.

Range Structure

The Grundfos pressure top-up and degassing portfolio consists of three ranges, each with a choice of formats and pump number and available to match a variety of fill pressures.

Type Key

Example	PHT	F	1	25
Range				
PHT	Pressure Holding Top-up			
PHD	Pressure Holding Degassing			
PHD-C	Combined Pressure Top-up and Degassing			
Format				
N	Narrow Format Wall Mounted Unit			
D	Deep Format Wall Mounted Unit			
F	Floor Standing Unit			
T	Twin System Unit			
V	Glycol (additional valves and tank)			
Number of Pumps				
1	One Pump			
2	Two Pumps			
Pressure ID				
25	Max Fill Pressure 2.5 Bar			
30	Max Fill Pressure 3.0 Bar			
50	Max Fill Pressure 5.0 Bar			
80	Max Fill Pressure 8.0 Bar			
100	Max Fill Pressure 10.0 Bar			

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PHT - Pressure Holding Top-up Range

With a combination of reliable pumps, advanced control and a choice of external communication protocols, the new PHT range of pressurisation units from Grundfos delivers peace of mind, energy efficiency and maximum system availability. Part of the extensive portfolio of packaged pumps sets available from Grundfos, these intelligent systems are suitable for use in a wide range of residential, commercial and industrial applications.

Specifically created to efficiently maintain the required water pressure in sealed heating and cooling systems, the PHT range comprises an advanced pressure monitoring system, reliable, energy efficient pumps and a break tank that incorporates a category 5 A/B air gap, preserving the integrity of the mains water supply while minimising space requirements.

To ease set-up, management and maintenance, set points and alarms can be changed via a simple but secure user interface combined with a local status display. This is enhanced by advanced component monitoring and reporting, and a choice of output communications protocols to provide diagnostic and remote status indication.

Pressure holding top-up units should be combined with a suitable expansion vessel from the Grundfos range (see page 16) and can be protected from the detrimental effects of debris and air via Grundfos vent and debris collection equipment (see page 23).

Selection

The PHT top-up equipment is selected against the required top-up pressure and in some cases the expected delivery flow rate required for top-up.

For convenience, wall mounted or floor standing formats can be chosen and in many cases the option to specify a second pump for duty assist and partial redundancy is available.

When two systems are needed, the twin system T-series provides the solution with minimal space requirements, while when glycol is present in the medium being pumped the PHT-V offers an automatic glycol metering solution.

Location

The PHT should be installed on the return header of the system on the suction side of the circulating pump.

The point of connection will be treated as the system neutral point, and the system expansion vessel should also be located at this connection.

Common Range Data

Unit Rating	PN10
Electrical Requirements	230V, 50Hz, 1 Phase
Noise output	<75 dbA
Fluid Category Protection	5 AB Weir Overflow Air Gap

PHT N-Series

The N-Series is narrow format wall mounted unit for low flow (<0.4 l/min). It has a 2 litre break tank and is suitable for large residential or small commercial applications (Up to 2500 litres maximum system volume).

Standard Features

- MODBUS communication output
- Simple, security coded user interface
- Event logging
- Low water sensor
- Durable powder coated enclosure
- Long life, gun metal pump casings
- Reliable continuously rated pump(s)
- WRAS approved components

Maximum Operating Conditions

- Maximum system temperature 85°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

Options

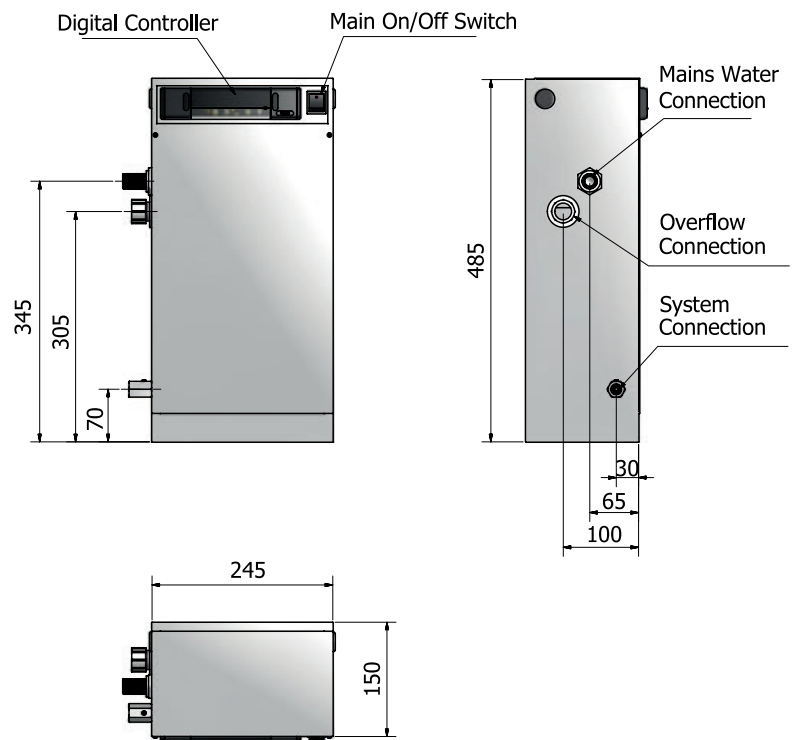
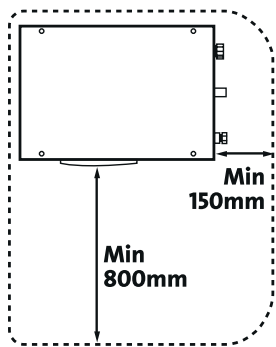
- Single or twin pump versions
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)



Break Tank Capacity	Dimensions (mm)			Connections (mm)		
	Width	Depth	Height	System	Mains Supply	Drain
2 Litre	245	150	485	8 (1/4")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (kW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT N130	1	3	0.1	0.4	7.8	98333178
PHT N230	2	3	0.1	0.4	8.0	98333179

Clearance and Connections



PHT D-Series

The D-Series is a deeper format wall mounted pressurisation unit with a 4 litre break tank for higher flow applications (12 l/min).

Standard Features

- MODBUS communication output
- Simple, security coded user interface
- Event logging
- Low water sensor
- Durable powder coated enclosure
- Long life, gun metal pump casings
- Reliable continuously rated pump(s)
- WRAS approved components

Maximum Operating Conditions

- Maximum system temperature 85°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

Options

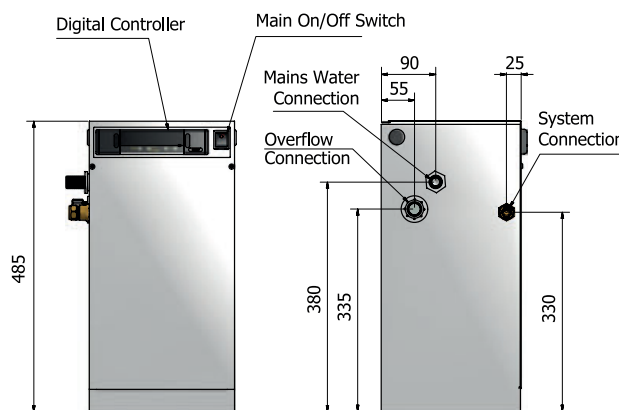
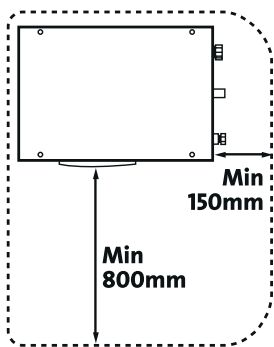
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)



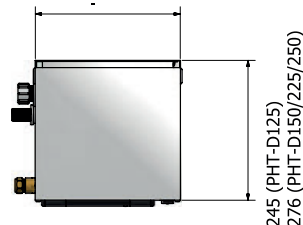
Break Tank Capacity	Pump Qty	Dimensions (mm)			Connections (mm)		
		Width	Depth	Height	System	Mains Supply	Drain
4 Litres	1	360	276	485	15 (1/2")	15 (1/2")	22
4 Litres	2	360	276	485	15 (1/2")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT-D125	1	2.5	0.43	1.9	13.5	98333180
PHT-D150	1	5	0.9	4.3	14.5	98333201
PHT-D225	2	2.5	0.43	1.9	16	98333202
PHT-D250	2	5	0.9	4.3	18	98333203

Clearance and Connections



245 (PHT-D125)
360 (PHT D150/225/250)



PHT F-Series

The F-Series is a floor standing, high flow (<18 l/min) top-up pressurisation unit with an 18 litre break tank, for use in medium sized commercial systems.



Standard Features

- MODBUS communication output
- Simple, security coded user interface
- Event logging
- Low water sensor
- Durable powder coated enclosure
- Long life, gun metal pump casings
- Reliable continuously rated pump(s)
- WRAS approved components

Maximum Operating Conditions

- Maximum system temperature 85°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

Options

- Single or twin pump versions
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

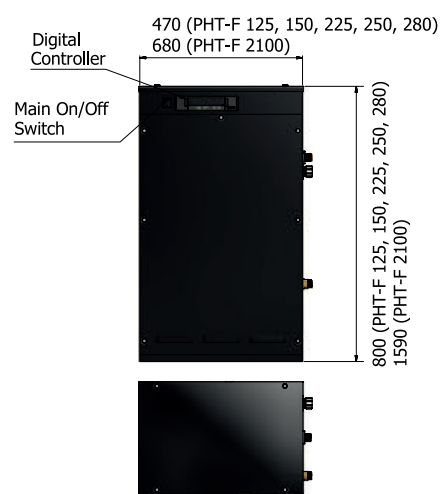
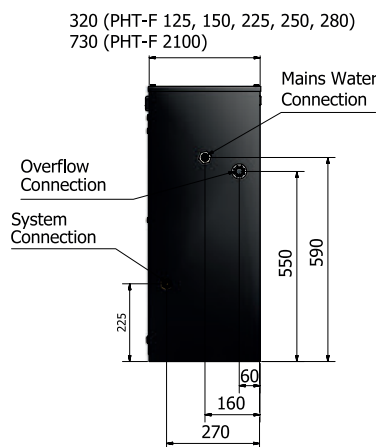
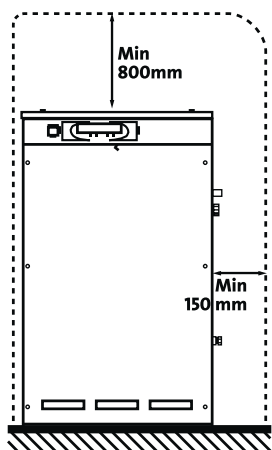
Break Tank Capacity	Dimensions (mm)			Connections (mm)		
	Width	Depth	Height	System	Mains Supply	Drain
18 Litre	470	320	800	15 (1/2")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT-F 125	1	2.5	0.43	1.9	28	98333204
PHT-F 225	2	2.5	0.43	1.9	28	98333205
PHT-F 150	1	5	0.9	4.3	30	98333206
PHT-F 250	2	5	0.9	4.3	40	98333207
PHT-F 180	1	8	0.75	5.6	33	98333208
PHT-F 280	2	8	0.75	5.6	42	98333209

Break Tank Capacity	Dimensions (mm)			Connections (mm)		
	Width	Depth	Height	System	Mains Supply	Drain
18 Litre	680	730	1590	15 (1/2")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT-F2100	1	10	1.1	6.7	170	98333209
PHT-F2100BN	1	10	1.1	6.7	170	TBA

Clearance and Connections



PHT T-Series

The twin system T-Series is ideal where space restrictions make it beneficial to locate two systems in a single enclosure. Floor standing, this system combines two high flow (<18 l/min) top-up pressurisation units with a single 18 litre break tank.

Standard Features

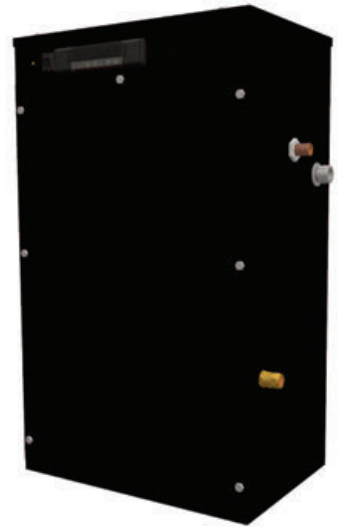
- MODBUS communication output
- Simple, security coded user interface
- Event logging
- Low water sensor
- Durable powder coated enclosure
- Long life, gun metal pump casings
- Reliable continuously rated pump(s)
- WRAS approved components

Maximum Operating Conditions

- Maximum system temperature 85°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

Options

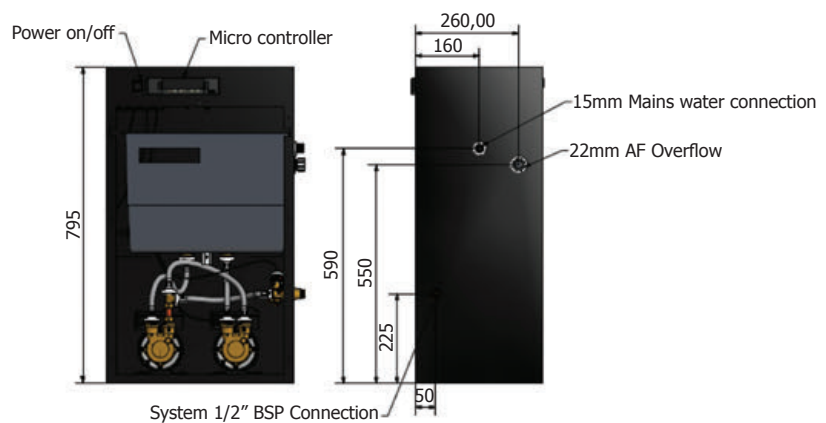
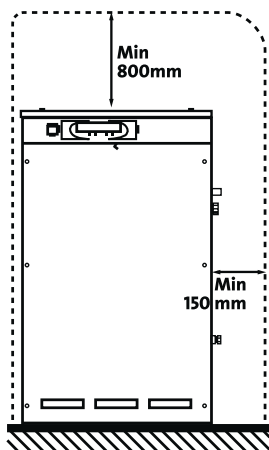
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)



Break Tank Capacity	Dimensions (mm)			Connections (mm)		
	Width	Depth	Height	System	Mains Supply	Drain
18 Litre	470	320	800	2 x 15 (1/2")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT T225	2	2.5	2 x 0.43	2 x 1.9	30	98333214
PHT T250	2	5	2 x 0.9	2 x 4.3	40	98333215

Clearance and Connections



PHT V-Series

The V-Series is a floor standing, glycol mixing top-up pressurisation unit (<18 l/min). Each time the V-Series tops up the system with water, it also automatically adds glycol from a dedicated tank at a predetermined rate, reducing manual intervention and maximising system protection.



Standard Features

- MODBUS communication output
- Simple, security coded user interface
- Event logging
- Low water sensor
- Durable powder coated enclosure
- Long life, gun metal pump casings
- Reliable continuously rated pump(s)
- WRAS approved components

Maximum Operating Conditions

- Maximum system temperature 85°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

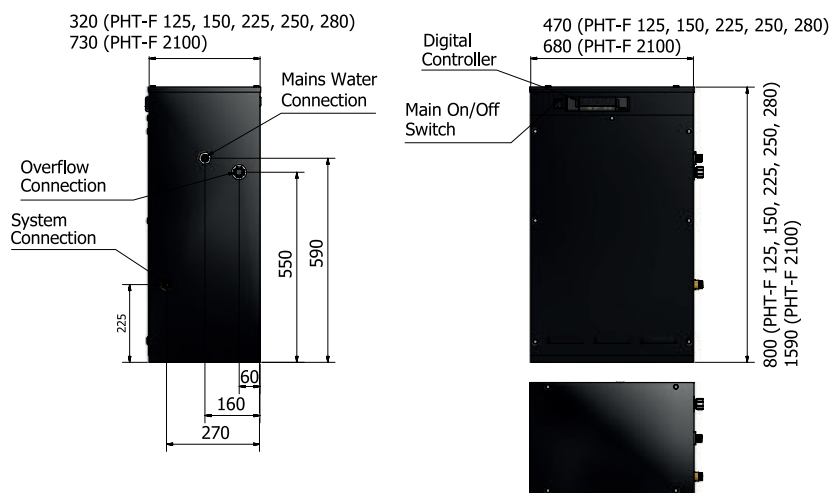
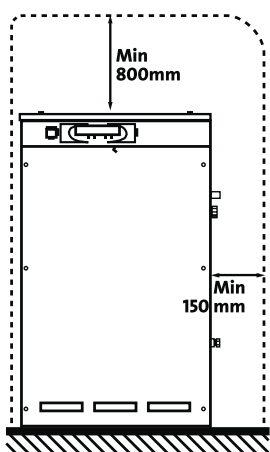
Options

- Single or twin pump versions
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

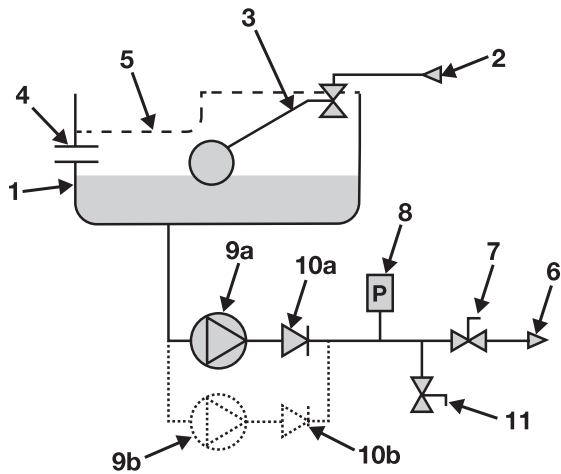
Break Tank Capacity	Dimensions (mm)			Connections (mm)		
	Width	Depth	Height	System	Mains Supply	Drain
18 Litre	480	330	1160	15 (1/2")	15 (1/2")	22

Product Name	Pump Qty	Max Cold Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Dry Weight (Kg)	Product Code
PHT V225	2	2.5	0.43	1.9	41	98333216
PHT V250	2	5	0.9	4.3	51	98333217
PHT V280	2	8	0.75	5.6	53	98333218

Clearance and Connections



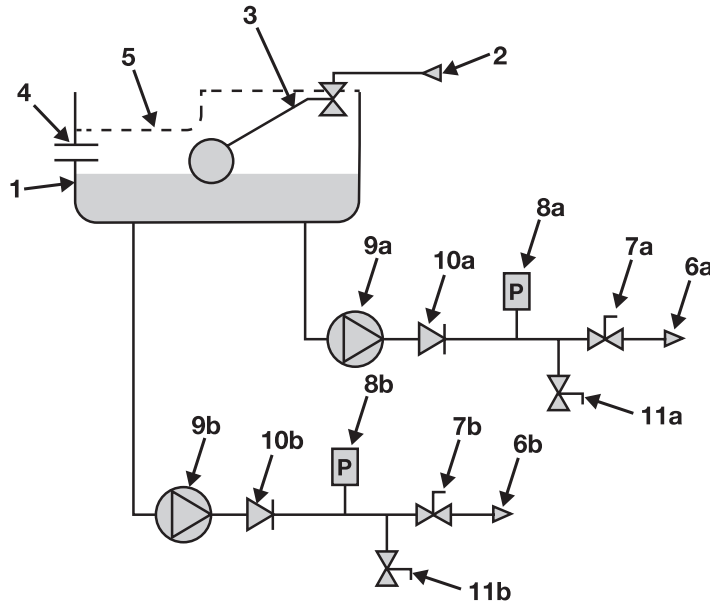
PHT-F, PHT-D Schematic



Key

1. Break Tank
2. Mains Water Inlet
3. Float Operation Valve
4. Overflow Connection
5. AB Air Gap Backflow
6. Supply To Sealed System
7. Isolation Valve
8. Pressure Transmitter
9. Pumps
10. Non Return Valve
11. Drain Valve
12. WaterBalancing Valve
13. Glycol Balancing Valve
14. Glycol Tank

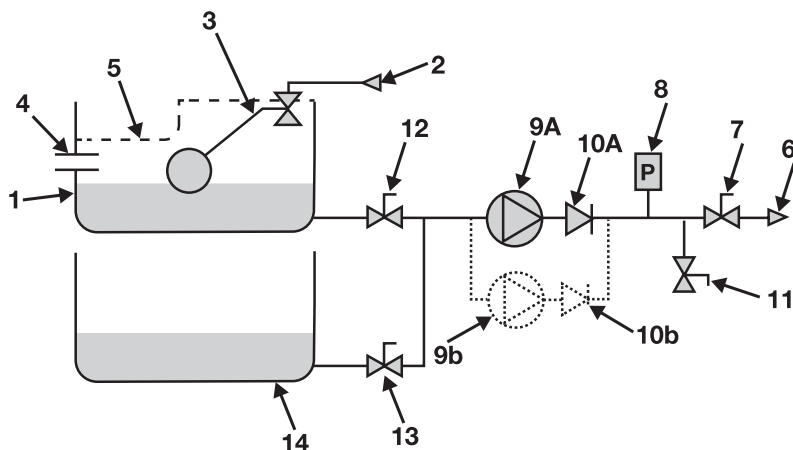
PHT-T Schematic



Key

1. Break Tank
2. Mains Water Inlet
3. Float Operation Valve
4. Overflow Connection
5. AB Air Gap Backflow
6. Supply To Sealed System
7. Isolation Valve
8. Pressure Transmitter
9. Pumps
10. Non Return Valve
11. Drain Valve
12. WaterBalancing Valve
13. Glycol Balancing Valve
14. Glycol Tank

PHT-V Schematic



Key

1. Break Tank
2. Mains Water Inlet
3. Float Operation Valve
4. Overflow Connection
5. AB Air Gap Backflow
6. Supply To Sealed System
7. Isolation Valve
8. Pressure Transmitter
9. Pumps
10. Non Return Valve
11. Drain Valve
12. WaterBalancing Valve
13. Glycol Balancing Valve
14. Glycol Tank

PHD Vacuum Degassing Equipment

PHD (Pressure Holding Degasser) vacuum degassing equipment is used to remove dissolved gasses from sealed chilled and heating systems. The PHD equipment utilises a multifunction digital controller with a simple user interface.

PHD equipment is an advanced product that combines a pressure step principle with a side stream configuration to minimise the effects the main thermal system.

The real-time display shows the status of the equipment while monitoring the system pressure and the health of its own components.



Features

- Multi code access for security
- Event logging
- Self Diagnostics
- Simple control programming
- Powder coated enclosure

Selection

The PHD top-up equipment is selected against the required system running pressure.

Both wall mounted and floor standing formats are available and through the PHD-C there is also the ability to integrate vacuum degassing with a top-up feature, complete with air gap break tank to maintain the integrity of the cold water mains supply.

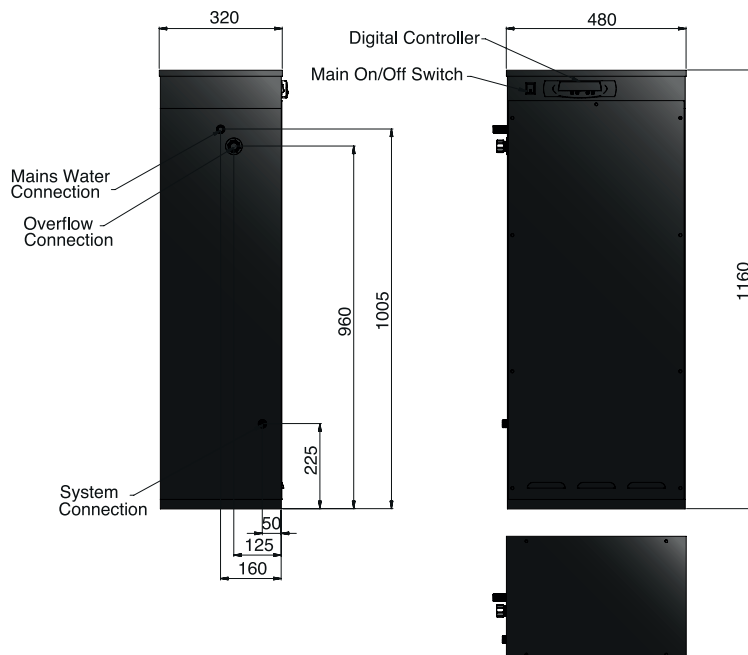
Maximum Operating Conditions

- Maximum Temperature at the point of connection 70°C
- Ambient temperature up to 40°C
- Relative humidity 95% non-condensing

Location

The PHD should be installed on the cold return header of the system, on the suction side of the circulating pump, to keep the water temperature as cool as possible whilst taking advantage of the reduced (suction) pressure created by the circulating pump.

Connections



PHD Series

Floor and Wall Mounted Vacuum Degassers

Grundfos PHD (Pressure Holding Degasser) equipment is used with chilled systems. This equipment samples water from the system in a side stream manner, minimising the effect on system pressure or flow. The sampled water is then subjected to a vacuum, dramatically 'stepping' the pressure down and making full use of Henry's Law relating to pressure. With the reduction in pressure, the water sample boils within the cylinder, the dissolved gases are liberated and as the equipment completes its cycle the liberated gases are pushed out of the automatic air vent.



Noise output	<75 dbA
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Product Name	Electrical Power Supply	Power Consumption (KW)	Full Load Current (amps)	Product Code
PHD 150	230/1/50	0.5	3.4	98333668
PHD 160	230/1/50	2 x 0.5	2 x 3.4	98333669
PHD 180	230/1/50	2 x 0.75	2 x 5.6	98333670
PHD 816	415/3/50	2 x 2.2	2 x 6.6	98333671

Product Name	Pump Quantity	Orientation	Pressure Rating (PN)	System Operating Pressure (bar)
PHD 150	1	Wall Mounted	10	1 – 5
PHD 160	2	Floor Standing	10	1 – 6
PHD 180	2	Floor Standing	10	1 – 8
PHD 816	2	Floor Standing	16	8 - 16

Product Name	Dimensions (mm)			System Connections (mm)	Dry Weight (Kg)
	Width	Depth	Height		
PHD 150	410	290	480	15mm	22
PHD 160	470	320	800	15mm	51
PHD 180	600	320	800	15mm	60
PHD 816	650	450	800	15mm	90

PHD C-Series

Floor and Wall Mounted Vacuum Degassers with Top-up Capability

The PHD C-Series is a combined vacuum degassing and top-up pressurisation system. Models should be selected against the required system running pressure and include both wall mounted and floor standing versions. Options are available that include a top-up feature complete with air gap break tank to maintain the integrity of the cold water mains supply.



Noise Output	<75 dbA
Fluid Category Protection	5 Weir Overflow Air Gap

Product Name	Electrical Power Supply	Power Consumption (KW)	Full Load Current (amps)	Product Code
PHD C150	230/1/50	0.5	3.4	98333210
PHD C160	230/1/50	2 x 0.5	2 x 3.4	98333211
PHD C180	230/1/50	2 x 0.75	2 x 5.6	98333212
PHD C816	415/3/50	2 x 2.2	2 x 6.6	98333213

Product Name	Pump Quantity	Maximum Fill Pressure (bar)	Orientation	Pressure Rating (PN)	Break Tank Volume (litres)	System Operating Pressure (bar)
PHD C150	1	5.0	Wall Mounted	10	4	1 – 5
PHD C160	2	6.0	Floor Standing	10	18	1 – 6
PHD C180	2	8.0	Floor Standing	10	18	1 – 8
PHD C816	2	16.0	Floor Standing	16	18	8 - 16

Break Tank Capacity	Dimensions (mm)			Connections (mm)			Dry Weight (Kg)
	Width	Depth	Height	System	Mains Supply	Drain	
PHD C150	410	290	480	2 x 15	15	22	28
PHD C160	470	320	1160	2 x 15	15	22	60
PHD C180	600	320	1160	2 x 15	15	22	74
PHD C816	650	450	1160	2 x 15	15	22	120

Model	PHT					PHD
	N-Series	D-Series	F-Series	T-Series	V-Series	C-Series
Mechanical Features						
Cabinet	●	●	●	●	●	●
Wall mounted	●	●				○
Floor mounted			●	●	●	○
Duty pump	●	●	●	●	●	●
Duty / standby pumps	○	○	○		●	
Glycol mix					●	
De- gasser						●
Twin system				●		
Pump inlet strainer	●	●	●	●	●	●
Pump non return valve	●	●	●	●	●	●
Common outlet isolation valve	●	●	●	●	●	●
Category 5 A/B air gap to BS13077	●	●	●	●	●	●
Electrical Features						
Pressure transducer control	●	●	●	●	●	●
Password protection	●	●	●	●	●	●
LED display	●	●	●	●	●	●
Pump trip and fail monitoring	●	●	●	●	●	●
System flood detection	●	●	●	●	●	●
Service due reminder	●	●	●	●	●	●
Adjustable differential	●	●	●	●	●	●
Cascade - duty /assist	○	○	○	○	○	●
Manual run	●	●	●	●	●	●
Low water alarm	●	●	●	●	●	●
High water alarm	○	○	○	○	○	○
Excessive starts alarm	●	●	●	●	●	●
Hours run	●	●	●	●	●	●
System fill function		●	●	●	●	●
Pump activation counter	●	●	●	●	●	●
Power interrupted counter	●	●	●	●	●	●
Alarm logging	●	●	●	●	●	●
Anti seize run (60 days)	●	●	●	●	●	●
Automatic duty rotation (twin pump units)	●	●	●	●	●	●
MODBUS	●	●	●	●	●	●
BACnet	○	○	○	○	○	○
Volt Free Contacts - 8A/ 230v						
Pump 1 healthy - normally open	●	●	●	●	●	●
Pump 2 healthy - normally open	●	●	●	●	●	●
Low pressure - normally open	●	●	●	●	●	●
High pressure - normally open	●	●	●	●	●	●
Sensor health - normally open	●	●	●	●	●	●
Boiler interlock / Common alarm - Normally closed / failsafe	●	●	●	●	●	●

Key
 ● Standard ○ Option

PHT Range Table

Product Name	Pump Quantity	Maximum Fill Pressure (bar)	Power Consumption (KW)	Full Load Current (amps)	Product Code
PHT N130	1	3.0	0.048	0.4	98333178
PHT N230	2	3.0	0.048	0.4	98333179
PHT D125	1	2.5	0.43	1.9	98333180
PHT D150	1	5.0	0.9	4.3	98333201
PHT D225	2	2.5	0.43	1.9	98333202
PHT D250	2	5.0	0.9	4.3	98333203
PHT F125	1	2.5	0.43	1.9	98533266
PHT F225	2	2.5	0.43	1.9	98533268
PHT F150	1	5.0	0.9	4.3	98533269
PHT F250	2	5.0	0.9	4.3	98533270
PHT F180	1	8.0	0.75	5.6	98533301
PHT F280	2	8.0	0.75	5.6	98533302
PHT T225	1	2.5	2 x 0.43	2 x 1.9	98333214
PHT T250	1	5.0	2 x 0.9	2 x 4.3	98333215
PHT V225	2	2.5	0.43	1.9	98333216
PHT V250	2	5.0	0.9	4.3	98333217
PHT V280	2	8.0	0.75	5.6	98333218

BACnet and High Water Alarm Options

For BACnet products add the suffix “-BN” to the Product Name. To include the High Water Alarm add the suffix “-H”.

Note that the above Product Codes refer to basic units without BACnet or High Water Alarm - please contact Grundfos for product codes for these variants if required. Dimensions remain the same as for basic units, weights increase by less than 200g.

PHT Range Dimensions Table

Product Name	Dimensions (mm)			Connections (mm)			Dry Weight (Kg)
	Width	Depth	Height	System	Mains Supply	Drain	
PHT N130	245	150	485	8 (1/4")	15 (1/2")	22	7.8
PHT N230	245	150	485	8 (1/4")	15 (1/2")	22	8
PHT D125	245	245	485	15 (1/2")	15 (1/2")	22	13.5
PHT D150	360	276	485	15 (1/2")	15 (1/2")	22	14.5
PHT D225	360	276	485	15 (1/2")	15 (1/2")	22	16
PHT D250	360	276	485	15 (1/2")	15 (1/2")	22	18
PHT F125D	470	320	800	15 (1/2")	15 (1/2")	22	28
PHT F225D	470	320	800	15 (1/2")	15 (1/2")	22	28
PHT F150D	470	320	800	15 (1/2")	15 (1/2")	22	30
PHT F250D	470	320	800	15 (1/2")	15 (1/2")	22	40
PHT F180D	470	320	800	15 (1/2")	15 (1/2")	22	33
PHT F280D	470	320	800	15 (1/2")	15 (1/2")	22	42
PHT T225	470	320	800	2 x 15 (1/2")	15 (1/2")	22	30
PHT T250	470	320	800	2 x 15 (1/2")	15 (1/2")	22	40
PHT V225	480	330	1160	15 (1/2")	15 (1/2")	22	41
PHT V250	480	330	1160	15 (1/2")	15 (1/2")	22	51
PHT V280	480	330	1160	15 (1/2")	15 (1/2")	22	53

Expansion Vessels

Expansion vessels are small tanks used to protect closed water heating and cooling systems from excessive pressure. The tank is partially filled with air or nitrogen, whose compressibility cushions shock caused by water hammer and absorbs excess water pressure caused by thermal expansion.

Traditional expansion tanks were larger and had no rubber diaphragm separating the water from the air pocket. This meant air gradually dissolved in to the water and transferred to the highest part of the system. As a result vessels regularly needed to be drained and systems bled of air to avoid corrosion and bacterial growth.

Grundfos vessels are divided in two by a rubber diaphragm. One side is connected to the pipe work of the heating system and therefore contains water. The other, the dry side, contains nitrogen gas under pressure, and a Schrader valve, similar to a car tyre valve, for checking pressures and adding nitrogen. When the heating system is empty, or at the low end of the normal range of working pressure, the diaphragm will be pushed against the water inlet. As the water pressure increases, the diaphragm moves, compressing the nitrogen on its other side.

The rubber diaphragm in Grundfos expansion tanks prevents the undesirable transfer of air and helps maintain low levels of oxygen, reducing corrosion in the system and saving on maintenance costs.

Flexcon 6 Bar Rated Expansion Vessel

The Flexcon 6 bar vessel range is suitable for use on sealed heating and chilled systems. Flexcon Top vessels can be mounted directly on top of sufficiently supported pipe work.

Installation

To ensure that the temperature at the Flexcon diaphragm does not exceed 70°C (system flow < 90°C), the vessel should be installed on the coldest part of the system, typically the return pipe to the heat exchanger. For systems running at elevated temperatures (system flow > 90°C), an intermediate vessel may be required to provide additional heat dissipation.

Features:

- Vessel comprises a high strength steel shell and butyl rubber diaphragm.
- Suitable to be used in large and small systems
- Available in a variety of sizes
- Manufactured in Europe and fully CE compliant



Product Name	Vessel Maximum Working Pressure	Maximum Vessel Efficiency	Connections	Volume	Dimensions (mm)		Weight	Product Code
	(Bar)	%	BSP M	(L)	Diameter	Height	(Kg)	
Flexcon Top 4	6	50	3/4"	4	194	257	1.6	98163796
Flexcon Top 8	6	50	3/4"	8	245	304	2.2	98165615
Flexcon Top 12	6	50	3/4"	12	286	336	2.1	98287720
Flexcon Top 18	6	50	3/4"	18	328	328	3.7	98057814
Flexcon Top 25	6	50	3/4"	25	358	380	4.5	98400541
Flexcon Top 35	6	50	1"	35	396	439	5.4	98400512
Flexcon Top 50	6	50	1"	50	435	495	11.2	98402056
Flexcon Top 80	6	50	1"	80	519	551	15	98404960
Flexcon 110	6	50	1"	110	484	784	23.8	98429145
Flexcon 140	6	50	1"	140	484	950	25.3	98164508
Flexcon 200	6	50	1"	200	484	1300	38.1	98492600
Flexcon 300	6	50	1"	300	600	1330	56.9	98400503
Flexcon 425	6	50	1"	425	790	1180	76.4	98045384
Flexcon 600	6	50	1"	600	790	1540	92.9	98364587
Flexcon 800	6	50	1"	800	790	1888	126.9	98471895
Flexcon 1000	6	40	1"	1000	790	2268	145.9	98391076

Flexcon 10 Bar Rated Expansion Vessel

The Flexcon 10 expansion vessel is suitable for use on sealed heating and chilled systems.

Installation

To ensure that the temperature at the Flexcon diaphragm does not exceed 70°C (system flow <90°C), the vessel should be installed on the coldest part of the system, typically the return pipe to the heat exchanger. For systems running at elevated temperatures (system flow >90°C), an intermediate vessel may be required to provide additional heat dissipation.

Features:

- Vessel comprises a high strength steel shell and butyl rubber diaphragm.
- Suitable to be used in large and small systems
- Available in a variety of sizes
- Manufactured in Europe and fully CE compliant



Product Name	Vessel Maximum Working Pressure	Maximum Vessel Efficiency	Connections	Volume	Dimensions (mm)		Weight	Product Code
	(Bar)	%	BSP M	(L)	Diameter	Height	(Kg)	
Flexcon 110	10	50	1"	110	484	784	23.8	98425014
Flexcon 140	10	50	1"	140	484	950	25.3	98073895
Flexcon 200	10	50	1"	200	484	1300	38.1	98134866
Flexcon 300	10	50	1"	300	600	1330	56.9	98425013
Flexcon 425	10	50	1"	425	790	1180	76.4	98415797
Flexcon 600	10	50	1"	600	790	1540	92.9	98425893
Flexcon 800	10	50	1"	800	790	1888	126.9	98471820
Flexcon 1000	10	40	1"	1000	790	2268	145.9	98401121

Airfix 16 Bar Rated Expansion Vessel

The Airfix 16 bar expansion vessel is intended for use on sealed heating and chilled systems. This expansion vessel may also be used on Potable (Wholesome) water systems.

Installation

To ensure that the temperature at the diaphragm does not exceed 70°C (system flow <90°C), the vessel should be installed on the coldest part of the system, (typically the return pipe to the heat exchanger). For systems running at elevated temperatures (>90°C flow), an intermediate vessel may be required to provide additional heat dissipation.

For Potable (Wholesome) water application please refer to National Standards and Building Regulations.

Features:

- High strength steel shell
- Replaceable EPDM rubber diaphragm
- Single threaded connection
- WRAS approved expansion vessel
- Available in a variety of sizes
- Suitable to be used in small and large systems.
- Manufactured in Europe and fully CE compliant



Product Name	Vessel Maximum Working Pressure	Maximum Vessel Efficiency	Connections	Volume	Dimensions (mm)		Weight	Product Code
	(Bar)	%	BSP M	(L)	Diameter	Height	(Kg)	
Airfix D-E-B 50	16	50	1 1/2"	50	450	830	58	98165519
Airfix D-E-B 80	16	50	1 1/2"	80	450	1010	69	98182502
Airfix D-E-B 120	16	50	1 1/2"	120	450	1265	83	98316264
Airfix D-E-B 180	16	50	1 1/2"	180	550	1255	124	98316265
Airfix D-E-B 240	16	50	1 1/2"	240	550	1515	147	98256758
Airfix D-E-B 300	16	50	1 1/2"	300	550	1855	178	98257175
Airfix D-E-B 600	16	50	2"	600	750	1840	282	98364586
Airfix D-E-B 800	16	50	2"	800	750	2230	333	98332614
Airfix D-E-B 1000	16	50	2"	1000	750	2730	398	98093175
Airfix D-E-B 1600	16	50	2 1/2"	1600	1000	2680	587	98093761
Airfix D-E-B 2000	16	50	2 1/2"	2000	1200	2400	657	98186364
Airfix D-E-B 3000	16	50	2 1/2"	3000	1200	3300	864	98186365

Vessel Selection Calculation

The following guidance is provided to assist with selection of the correct vessel for your application and uses calculations that conform to BS 7074. However, if you prefer, Grundfos are happy to assist you with your selection.

Vessel sizing centres around determining the minimum vessel sizing based upon the Expanded Volume of the system and the lower of either the Maximum Vessel Efficiency (see table on preceding pages) or the Acceptance Factor as below

$$\text{Minimum system vessel size} = \frac{\text{Expanded Volume}}{\text{Maximum Vessel Efficiency OR Acceptance Factor}} + 10\%$$

The Expanded Volume is the volume by which system water expands as it is heated and can be calculated from the water temperature with the assistance of standard reference tables. To provide a level of safety the maximum flow temperature should be used, not the average temperature. When the quantity of water in the system is unknown an approximation can be used: 12 litres of system water per 1kW of thermal input. For chilled systems Grundfos work with 18 litres per kW of thermal input when the actual volume is unknown.

Expanded Volume = Volume x Coefficient at Maximum Flow Temperature

EXAMPLE

For a system with a 100kW boiler we can estimate the water volume is 1200 litres. If the max. flow temperature is 82°C, tables give an expansion coefficient of 3.02%

$$\text{Expanded Volume} = 1200 \times 3.02\% = 36.24 \text{ litres}$$

The Maximum Vessel Efficiency is the design specification of the vessel, as shown on pages 17-19, whereas the Acceptance Factor takes into account the limitations that may be placed on the Maximum Vessel Efficiency by the design of a specific system. As the lower of the two values must be used in sizing it is important to confirm the Acceptance Factor for your specific system. This is done using the calculation below:

$$\text{Acceptance Factor} = \frac{\text{Maximum System Working Pressure (absolute)} - \text{Cold Fill Pressure (absolute)}}{\text{Maximum System Working Pressure (absolute)}}$$

Note the use of absolute pressures ie the requirement to add 1.0 bar atmospheric pressure to measured values.

Cold Fill Pressure is calculated from the static height, plus 0.3 bar to expel air.

Note: Cold Fill Pressure (including 3.0 bar to expel air) must not be less than 0.7 bar ie 1.7 bar(absolute).

EXAMPLE

For a system with Maximum Working Pressure 3.0 bar at the pressurisation set and a static height of 7.0 metres

$$\text{Cold Fill Pressure (absolute)} = \left(\frac{7.0 \text{ metres}}{10} \right) \text{ bar} + 0.3 \text{ bar} = 0.7 \text{ bar} + 0.3 \text{ bar} = 1.0 \text{ bar or } 2.0 \text{ bar(absolute)}$$

$$\text{Acceptance Factor} = \frac{(3.0 + 1.0) - (1.0 + 1.0)}{(3.0 + 1.0)} = \frac{2}{4} = 0.5$$

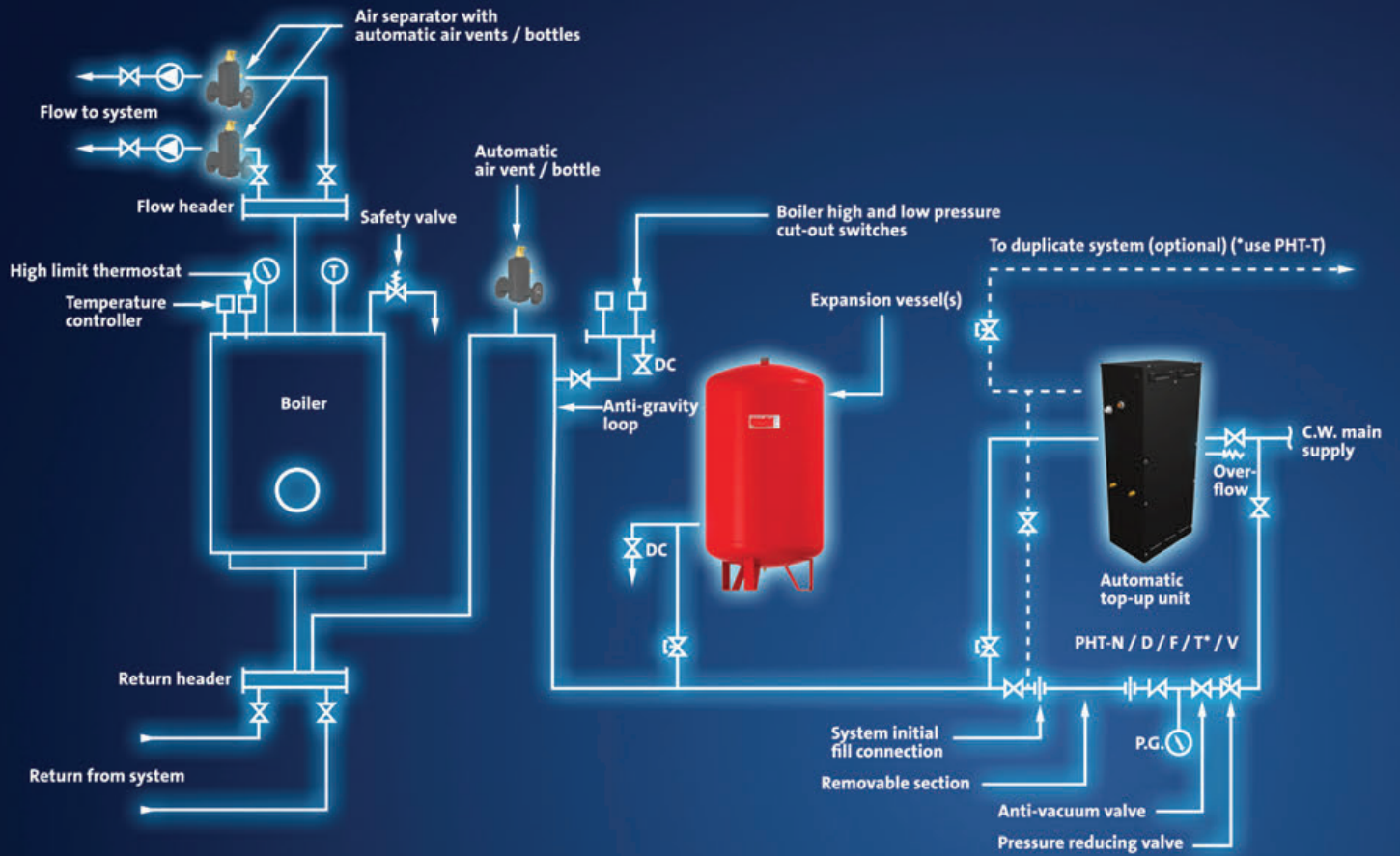
$$\text{Minimum Vessel Size} = \frac{36.24 \text{ litres}}{0.5} + 10\% = 79.73 \text{ litres}$$

Looking at the 6 bar pressure vessel range on page 17, the smallest vessel size is 80 litres. A check shows this vessel has a Maximum Vessel Efficiency of 50%, which is not smaller than the Acceptance Factor for the example system. This means an 80 litre vessel is the correct size to select.

Note that if your calculated Acceptance Factor is 40% or below, then you do not need to check back after the vessel has been sized, as 40% is the lowest Maximum Vessel Efficiency that Grundfos offers.

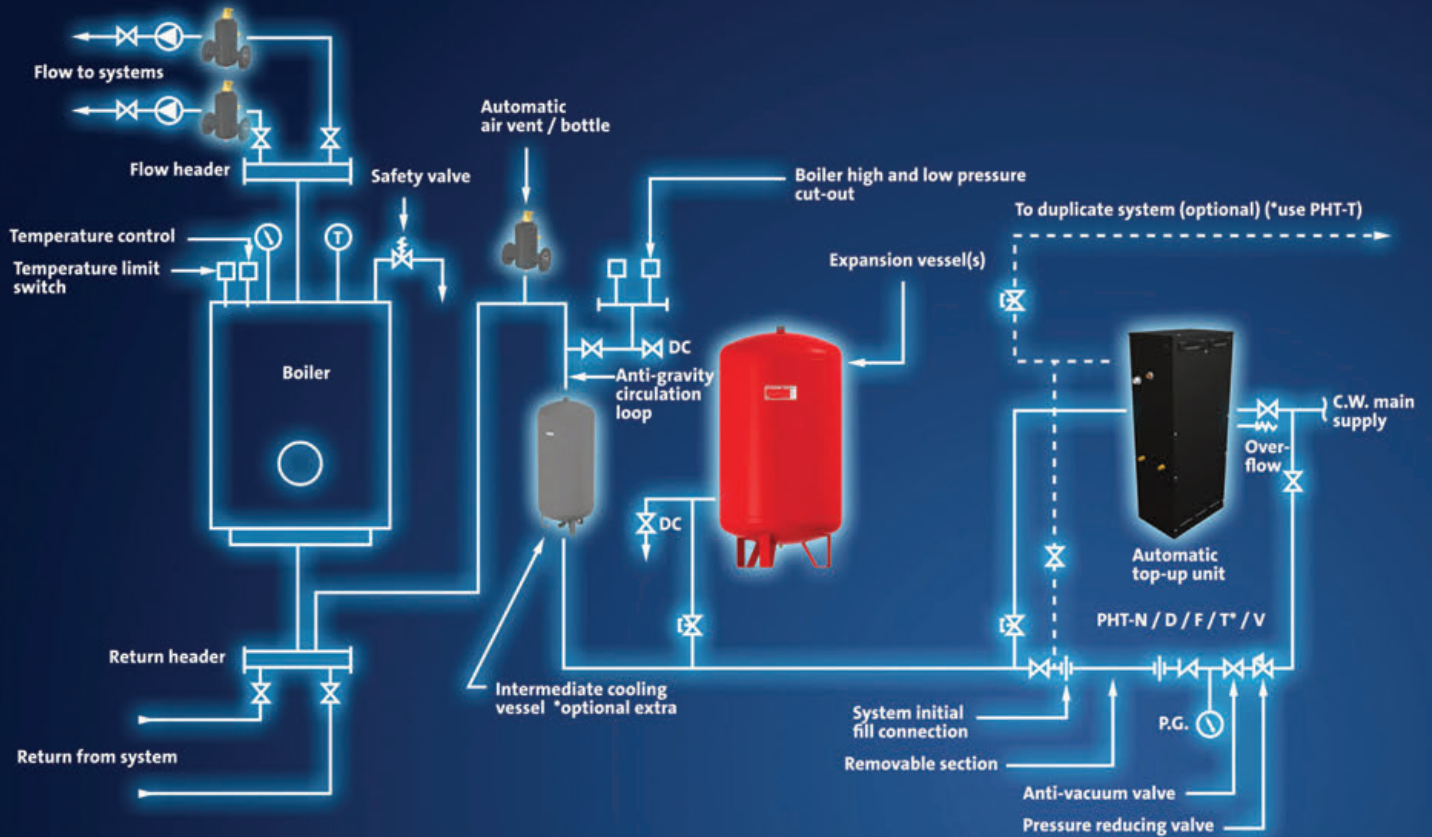
We realise using the above calculations can be time consuming and Grundfos is available to assist you with vessel selection if required.

Low temperature heating water system (Typical Installation)

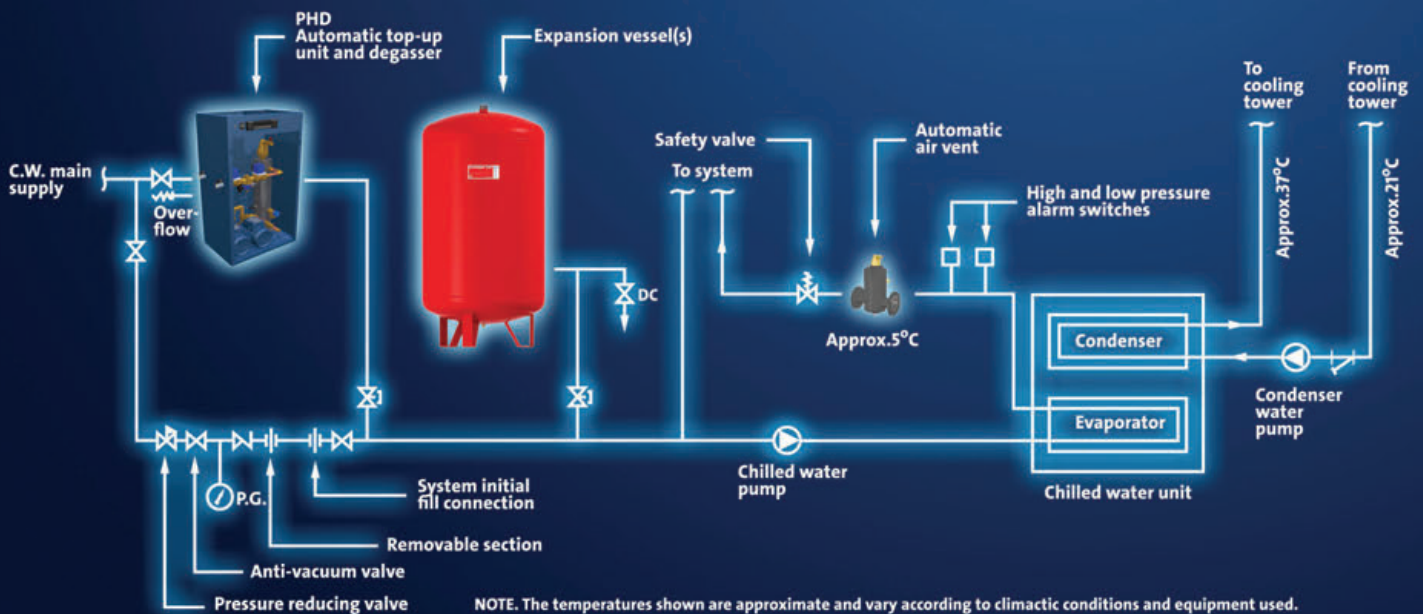


Key				
		DC Draincock		

Medium temperature heating water system (Typical Installation)



Chilled water system (Typical Installation)



Key

- | | | | | |
|------------------|------------------|-------------------------|--------------|-------------------|
| Lockshield valve | Non-return valve | Pressure reducing valve | Gate valve | Temperature gauge |
| Pressure gauge | Pump | DC Draincock | Safety valve | |

Also available from Grundfos

Debris and Air

The purpose of a heating or cooling system is to transfer hot or cold water to where it is needed. The optimum conditions for this is a clean system with fluid that contains as little air and dirt as possible. Below explains what can go wrong if air and debris are not removed.

Effects of air in the system:

- Sealed systems will always contain air and if not removed it will lead to commissioning problems, frequent manual venting, deteriorating pump performance and unnecessary energy consumption.
- It will also lead to corrosion products starting to flow round the system.
- Air can reduce the liquid displacement of a pump by 10 to 45%.
- Free air, along with localised micro-bubbles cause noise in systems, often amplified through unrelated equipment e.g. expansion vessels. Acoustic vibration also affects mechanical valves, seals and pumps reducing the component life

Effects of debris in the system:

- Debris consists mainly of corrosion particles, which are drawn to magnetic fields around pumps, valves and control valves which leads to malfunctions and heavy wear of system components.
- Debris clogs heat exchanger channels, fouls filters and causes excessive wear in circulating pumps, resulting in unnecessary energy consumption and persistent problems, malfunctions and system failures.

What is the Solution?

Grundfos Pressurisation and Separation equipment is designed to optimise the efficiency of heating and cooling installations in new buildings or buildings undergoing refurbishment by combating air and debris in the system head on. These products can be used in hotels, schools, hospitals, industrial process, food packing plants, shopping centres and high rise buildings.

Grundfos air vent - SSA

Grundfos vent systems remove micro-bubbles by essentially filtering out the bubbles. A large surface area is presented to the water as it flows through the equipment. The micro-bubbles adhere to the smooth surface and join together into larger bubbles in a process called coalescence. The larger bubbles do not have any momentum to be carried through the unit and simply float away to the automatic air vent located at the top of the equipment. This equipment is ideally suited to heating systems and is located directly after the heat generating equipment on the suction side of the pump. This makes the best use of Henry's Law combining the reduced pressure on the suction side of the pump along with the highest temperature in the system.

Grundfos vent clean - SSAD

Coupled with the established Grundfos vent (SSA) the SSAD has a sump and sludge trap, as water borne debris hits the Pall rings the forward momentum is lost, the debris is then free to fall into the sludge trap ready for manual removal via the venting port at a later stage.

Grundfos clean - SSD

As a standalone debris collector, the Grundfos Clean SSD is a sludge trap using Pall rings as a filter medium, allowing the water to flow through the unit with a minimal pressure drop. As the water borne debris hits the pall rings the forward momentum is lost, the debris is then free to fall into the sludge trap ready for manual removal via the venting port at a later stage. The SSD equipment has a unique sludge removal system, a manually operated rotary cutting tool incorporated inside the unit lifts settled sludge from the bottom of the sludge trap. Thus ensuring there is no internal sludge build up through settlement and assists with debris removal.

