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GRUNDFOS

# PRESSURISATION RANGE
# PRESSURE TOP UP UNITS AND DEGASSERS

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## 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 $CO_2$ 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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# CONTENTS

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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 |

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# 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

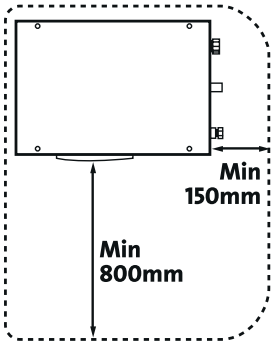
## Options

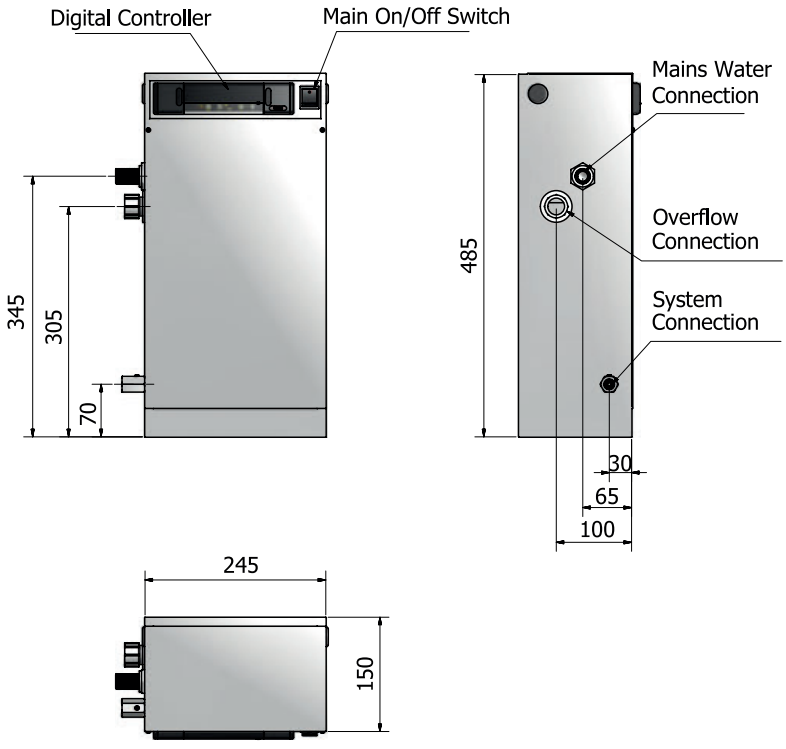
- Single or twin pump versions
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

| 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



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# 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

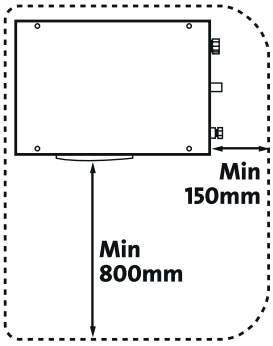
## Options

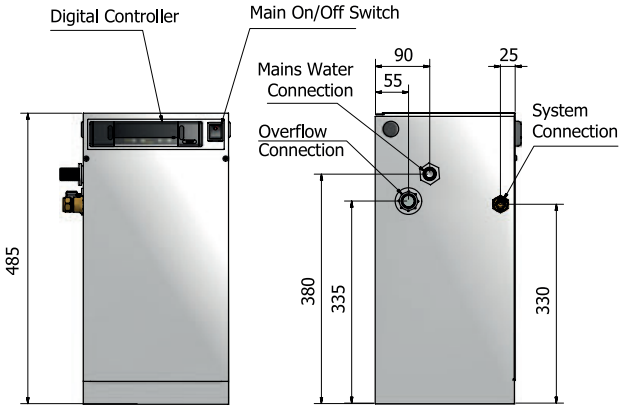
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

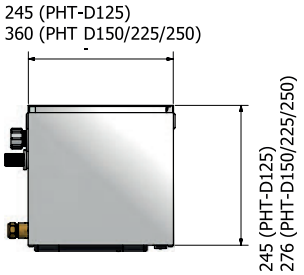
| Break Tank Capacity | Pump Qty | Dimensions (mm) | | | Connections (mm) | | |
|---|---|---|---|---|---|---|---|
| | | Width | Depth | Height | System | Mains Supply | Drain |
| 4 Litres | 1 | 360 | 276 | 485 | 15 (1/2") | 15 (1/2") | 22 |
| 4 Litres | 2 | 360 | 276 | 485 | 15 (1/2") | 15 (1/2") | 22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

| 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



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# 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)

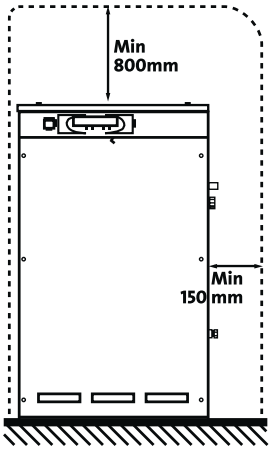
| Break Tank Capacity | Dimensions (mm) | | | Connections (mm) | | |
|---|---|---|---|---|---|---|
| | Width | Depth | Height | System | Mains Supply | Drain |
| 18 Litre | 470 | 320 | 800 | 15 (1/2") | 15 (1/2") | 22 |

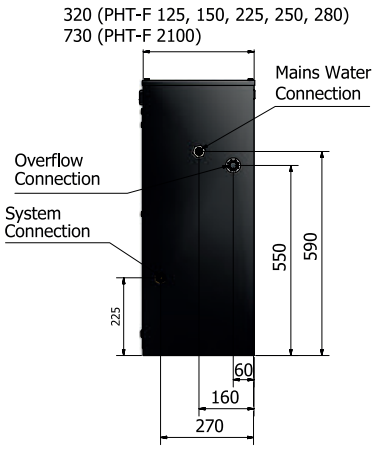
| Product Name | Pump Qty | Max Cold Fill Pressure (bar) | Power Consumption (KW) | Full Load Current (amps) | Dry Weight (Kg) | Product Code |
|---|---|---|---|---|---|---|
| PHT-F 125 | 1 | 2.5 | 0.43 | 1.9 | 28 | 98333204 |
| PHT-F 225 | 2 | 2.5 | 0.43 | 1.9 | 28 | 98333205 |
| PHT-F 150 | 1 | 5 | 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 |

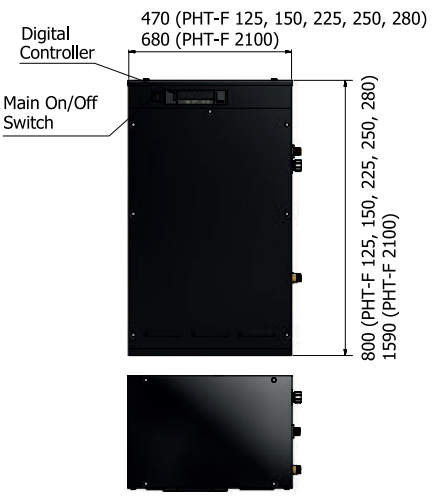
| Break Tank Capacity | Dimensions (mm) | | | Connections (mm) | | |
|---|---|---|---|---|---|---|
| | Width | Depth | Height | System | Mains Supply | Drain |
| 18 Litre | 680 | 730 | 1590 | 15 (1/2") | 15 (1/2") | 22 |

| 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



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# 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

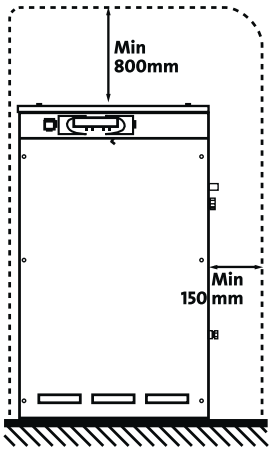
## Options

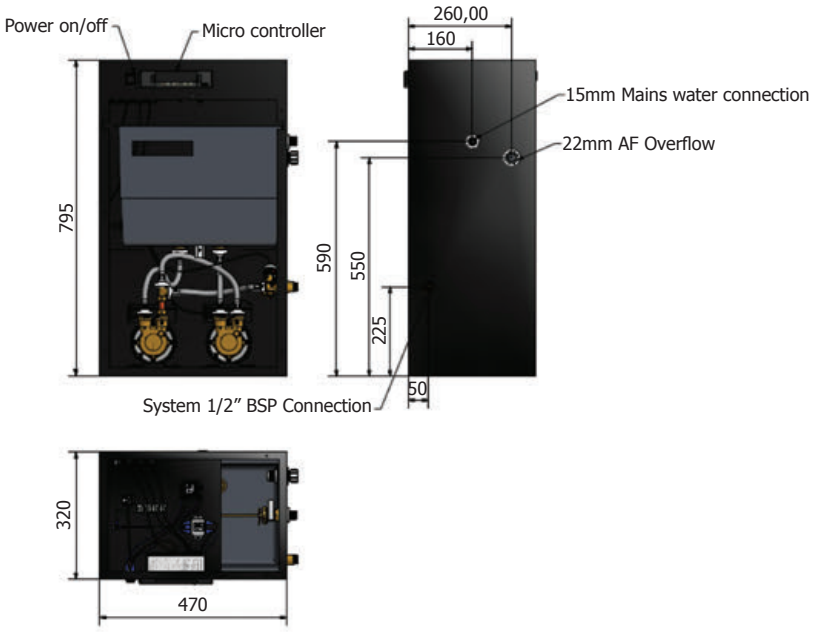
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

| 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



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# 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

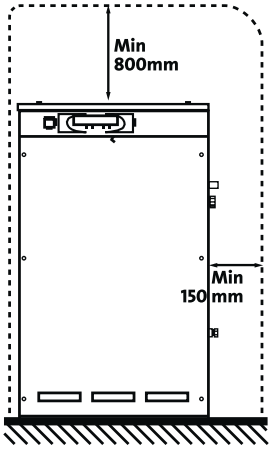
## Options

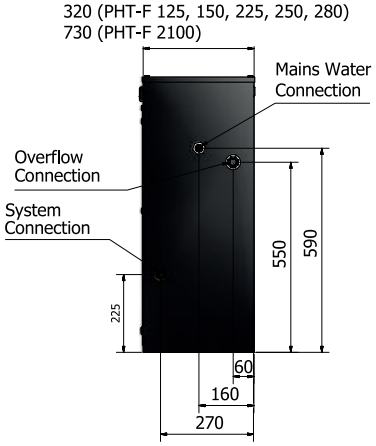
- Single or twin pump versions
- High water level sensor
- BACnet communication protocol (in addition to MODBUS communications)

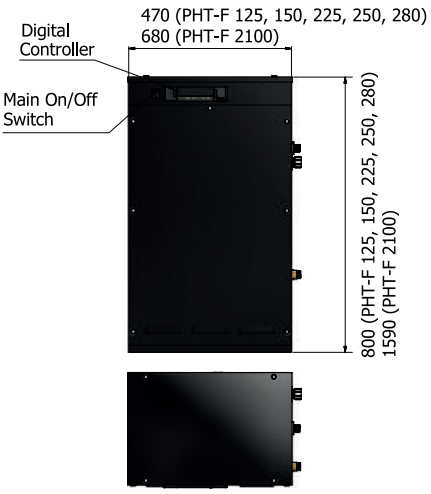
| Break Tank Capacity | Dimensions (mm) | | | Connections (mm) | | |
|---|---|---|---|---|---|---|
| | Width | Depth | Height | System | Mains Supply | Drain |
| 18 Litre | 480 | 330 | 1160 | 15 (1/2") | 15 (1/2") | 22 |

| 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



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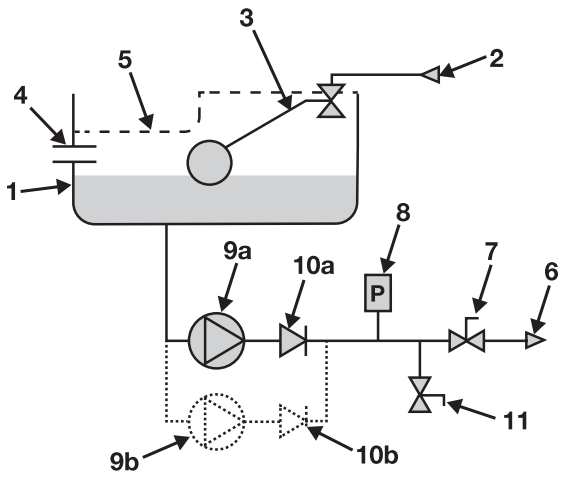
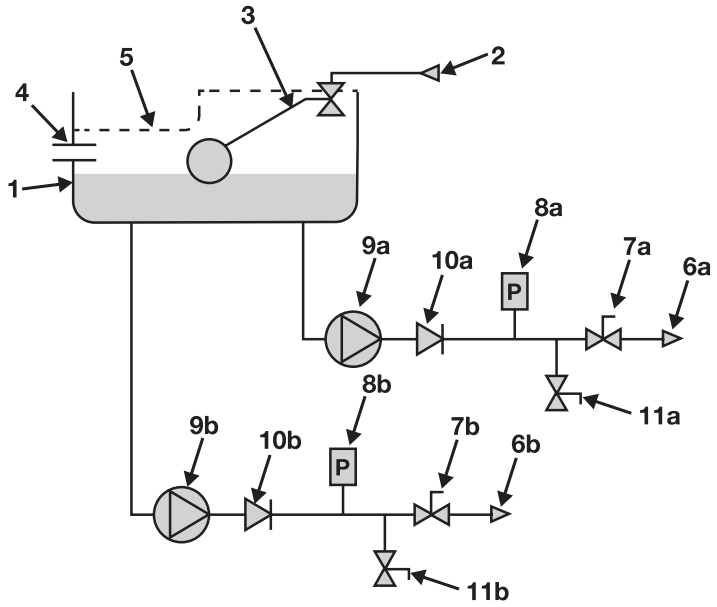
## PHT-F, PHT-D Schematic




**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

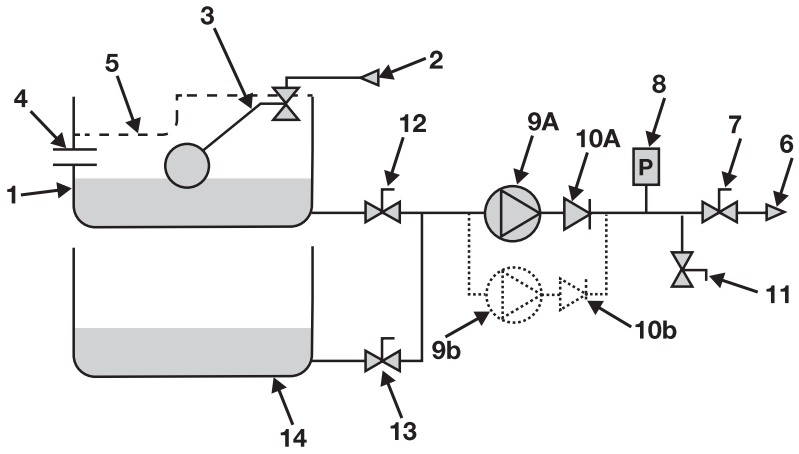
## PHT-T Schematic




**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

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# 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

## Maximum Operating Conditions

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

## Selection

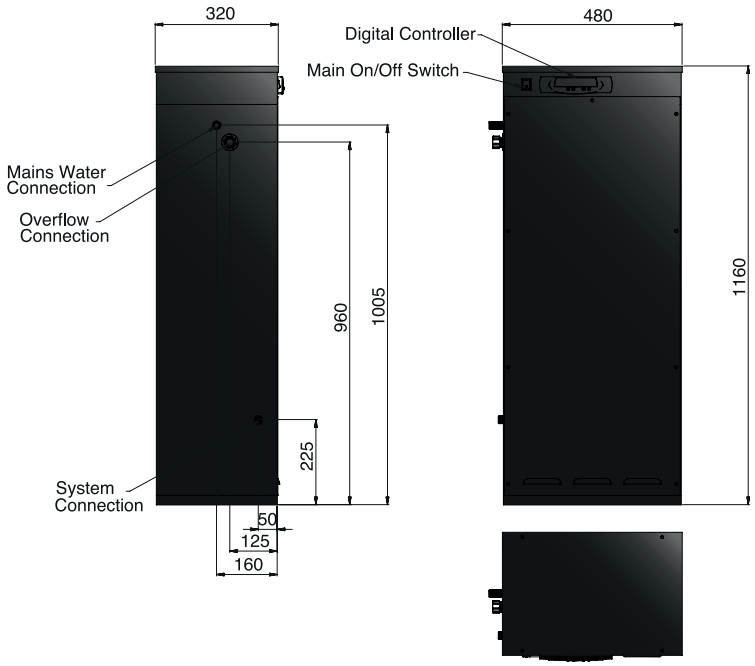
The PHD top-up equipment is selected against the required system running pressure.

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.

## 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



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# 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 |
|---|---|

| 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 |

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# 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 |

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| 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

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## 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 |

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# 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.

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# 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 |

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# 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 |

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# 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 |

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# 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

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

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%

**Expanded Volume = 1200 x 3.02% = 36.24 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:

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

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

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

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

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

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.**

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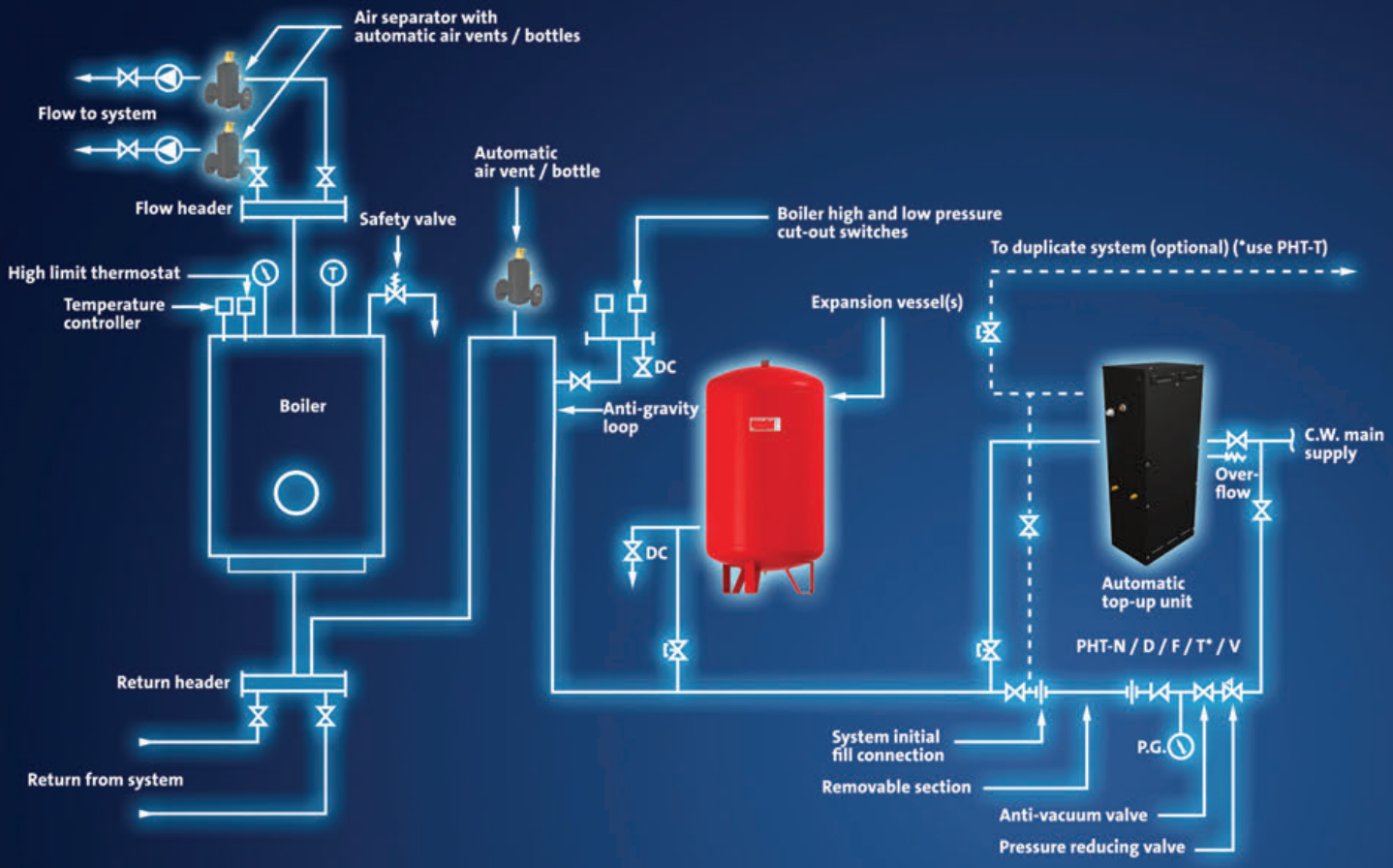
# Low temperature heating water system (Typical Installation)




**Key**

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

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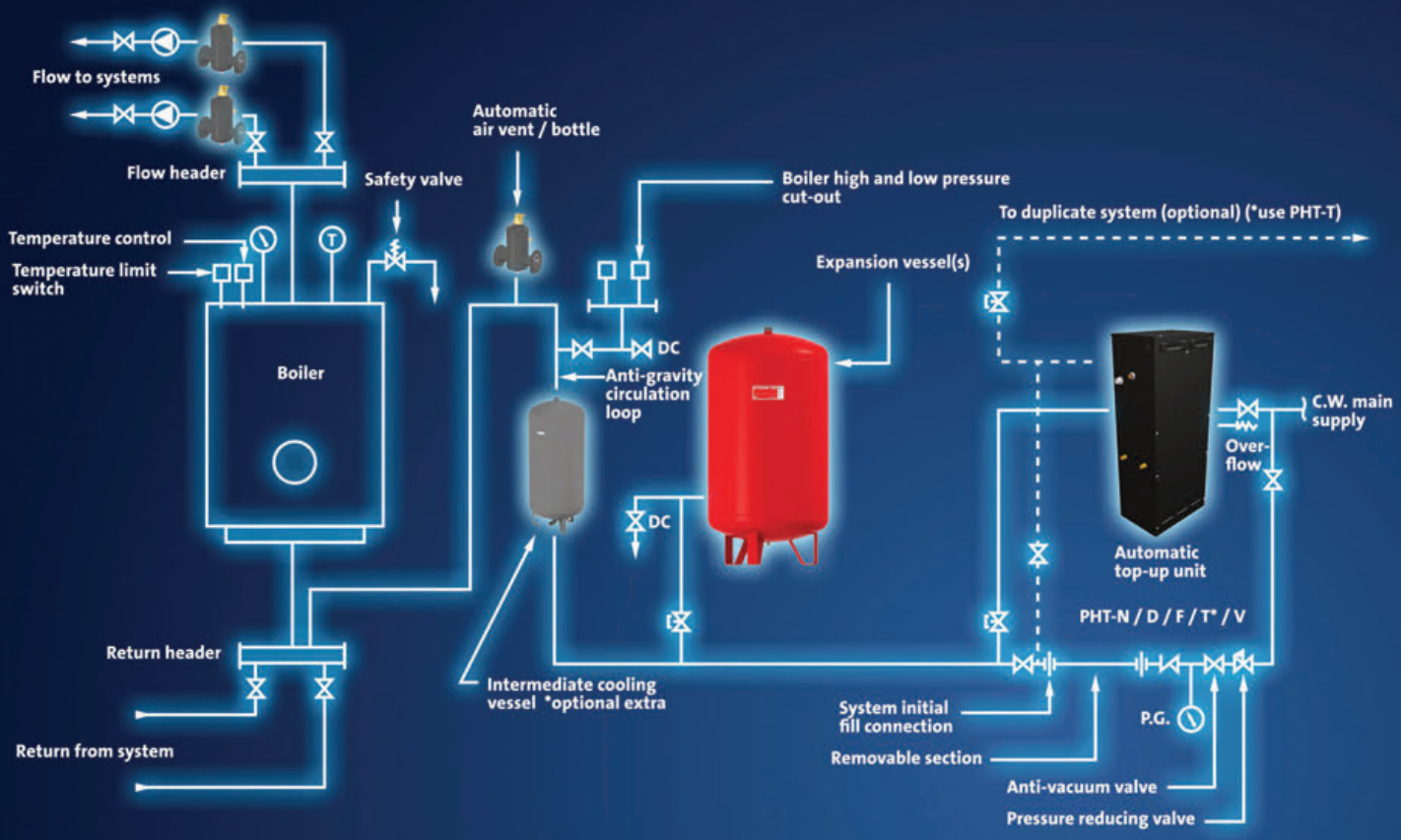
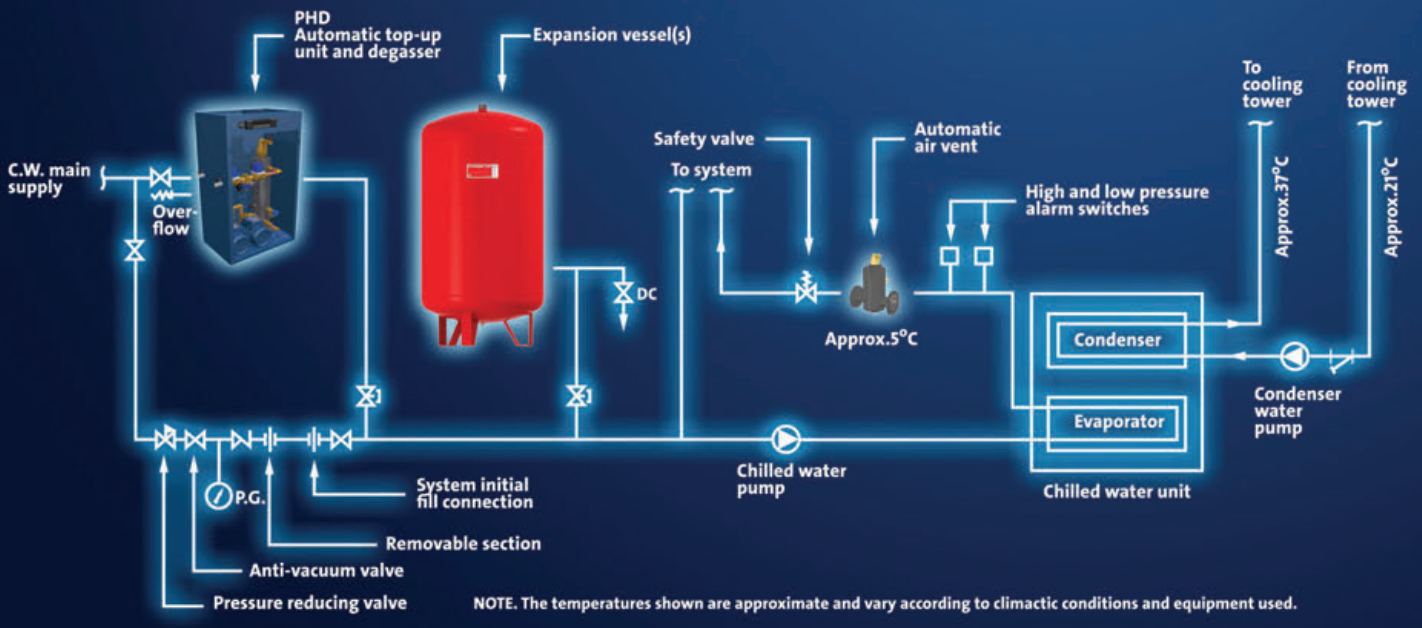
# Medium temperature heating water system (Typical Installation)




# Chilled water system (Typical Installation)




NOTE. The temperatures shown are approximate and vary according to climactic conditions and equipment used.

**Key**

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

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# 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 pump. Thus ensuring there is no internal sludge build up through settlement and assists with debris removal.

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