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WATER SOLUTIONS

flowvess©

PWR Expansion Vessel

OPERATION AND MAINTENANCE MANUAL

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flowtech® WATER SOLUTIONS

OPERATION & MAINTENANCE

CONTENTS

General
Information

These instructions are to assist in the installation of the flowvess PWR Expansion Vessels please follow them carefully.

If, having read this Operation & Maintenance Manual, there is any doubt about any aspect of the installation please don't hesitate to contact our technical team.

Definitions of Safety Warnings and Precautions

WARNING!

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION!

Indicates a potentially hazardous situation which, if not avoided. Can result in minor to moderate injury, or serious damage to the product.

Safety

Information

It is essential that correct and safe working practices are adhered to at all times when installing, operating and/or maintaining any piece of equipment. Always consult safety data sheets, operating and maintenance manuals, Health & Safety legislation and recommendations and specific requirements of any equipment manufacturer, site controller, building manager or any other persons or organisation relating to the procurement, installation, operation and/or maintenance of any piece of equipment associated or in conjunction with any product provided by **flow**tech Water Solutions.

This document is intended for ALL installers, operators, users and persons carrying out maintenance of this equipment and must be kept with the equipment, for the life of the equipment and made available to all persons at all times. Prior to carrying out any work associated with the set it is essential that the following sheets are read, fully understood and adhered to at all times.

Equipment must only be installed, operated, used, and/or maintained by a competent person. A competent person is someone who is technically competent and familiar with all safety practices and all of the hazards involved.

Any damage caused to any equipment by misapplication, mishandling or misuse could lead to risk of Electrocution, Burns, Fire, Flooding, death or injury to people and/or damage to property dependent upon the circumstances involved. **flow**tech Water Solutions accepts no responsibility or liability for any damage, losses, injury, fatalities or consequences of any kind due to misapplication, mishandling or misuse of any equipment, or as a result of failure to comply with this manual.

Failure to install, operate, use or maintain the equipment in accordance with the information contained within this document could cause damage to the equipment and any other equipment subsequently connected to it, invalidating any warranties provided by **flow**tech Water Solutions to the buyer.

Safety Warnings & Precautions

These instructions should be read and clearly understood before working on the system. Please read this manual carefully and all of the warning signs attached before installing or operating the equipment keep this manual handy for your reference. This equipment should be installed, adjusted and serviced by trained and qualified personnel. Failure to observe this precaution could result in bodily injury.

WARNING! - It is strongly recommended that the system is protected by a suitable pressure relief valve set at or below the maximum tank pressure rating. Failure to install a relief valve may result in tank explosion in the event of a system malfunction or over pressurization, resulting in property damage, serious personal injury or death.

WARNING! - If the pressure tank leaks or shows signs of corrosion or damage do not use it.

CAUTION! - It is strongly recommended that all electrical equipment conforms to National Electrical Codes and local regulations. Only qualified personnel should perform installation, alignment and maintenance. The manufacturer reserves the right to alter the technical data in order to make improvements or update information.

CAUTION! - Failure to observe these rules will render the guarantee invalid. The same applies to repair jobs and/or replacement. Your legal rights are not affected.

CAUTION! - The manufacturer declines all responsibility in the event of damage or injury caused as a result of tampering with the equipment.

CAUTION! - To prevent personal injury, ensure all water pressure is released from the pressure system prior to work being performed. Ensure pumps are disconnected and / or electrically isolated.

Customer / Contractor Responsibilities

It is the responsibility of the customer and/or the contractor:

- To ensure that anyone working on the equipment is wearing all necessary protective gear and/or clothing.
- Is aware of appropriate health & safety warnings.
- Has read the information in this section of the manual.

Mounting, operation, test before operation, regular check-up

The expansion vessel must be installed and commissioned by a suitable qualified installer and comply with national and local regulations.
Ensure there is no visible external damage to the body of the vessel before installation and operation.
The necessary inspections and tests must be performed during commissioning and after any major change to the system which may affect the expansion vessel according to the requirements of the Operational Safety Regulation.
Recommendations regarding periodic check-ups see paragraph “Periodic Check-up“.

Repairs to the Expansion Vessel

It is not permissible repair the vessel by welding or welding an item to it.
If repair or replacement is required use only genuine components supplied by the manufacturer.

Observe the Parameters

Details concerning manufacturer, year of manufacture, serial number and technical data are provided on the name plate.
Suitable measures must be taken to ensure that the specified permissible maximum and minimum operating parameters (pressure, temperature) are adhered to.
Exceeding the allowable pressure of the water and the gas systems both during operation and when filling the gas system must be prevented

On no account must the gas pre-pressure exceed the allowable pressure.
Even with vessels having an allowable pressure above 4 bar, the gas pre-pressure for storage and transport may not exceed 4 bar.
An inert gas, for instance nitrogen, should be used for the gas charge.

Corrosion and Encrustation

Vessels are made of steel, coated on external surfaces and un-treated internally.
No wear allowance (corrosion allowance) has been provided for.
They may only be used in atmospherically closed systems with non-corrosive and chemically non-aggressive water.
The ingress of atmospheric oxygen into the entire heating, solar and cooling water system through permeation, water replenishment, etc., must be reliably minimised during system operation.
The system should be designed to facilitate the inclusion and topping-up of the water treatment inaccordance with specification supplied by the water treatment supplier or system designer.

Thermal protection

In heated water systems, a warning instruction must be provided by the operator near the expansion vessel if persons are endangered by excessive surface temperatures.

Place of installation

Ensured the location for the expansion vessel has adequate load-carrying capacity, including when the vessel will be filled with water.
A drain must be provided adjacent to the vessel and a facility to add cold water if required - see also the section “Installation”.
The standard design of the vessels does not consider the forces of lateral acceleration.
Failure to heed these instructions, especially the safety instructions, can impair the operation, result in damage to the vessel and associated valves and be a danger to personnel.
Any claims for warranty and liability are excluded if these instructions are violated.

Application and Operating

Expansion vessels are suitable for maintaining pressure and volume compensation in closed heating, solar and cooling water systems.
In systems with glycol we recommend to use vessels with membrane. The glycol content in the water can

vary between 25% and 50%.
When adding inhibitors and water treatment the instructions of the manufacturer must be strictly followed, especially with regard to corrosion.

Vessels are unsuitable for oil and are not permitted for media of fluid group 1 according to directive 97/23/EC (e.g. toxic media).
Media other than those specified on request.

Performance Specification

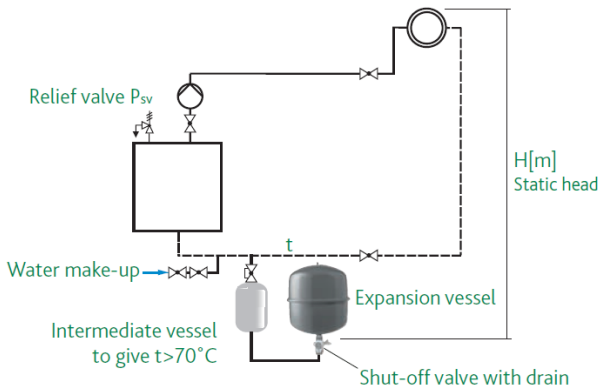
Max. allowable temperature: TSmax +120˚C
Min. allowable temperature: TSmin -10˚C
(only with addition of anti freeze)
Max. continuous operating temperature membrane diaphragm: 70˚C
Max. allowable pressure: PS_{max} type plate
Min .allowable pressure: PS_{min} 0 bar
Membrane: EN, R, C, up to S 33, G
Diaphragm: F, N, NG from S 50, SV
Gas space: Inert gas
(fluid group 2 acc. to Directive RL 97/23/EC)
Water space: Water
Water/Glycol mixture (min. 25% and max. 50% glycol) We recommend vessels with membranes fluid group 2 acc. to RL 97/23/EG

Install in a frost-free room so that inspection is possible from all sides, the gas filling valve and the water shut-off and discharge valves are accessible and the name plate remains visible.
A Stress-free, vibration-free installation is required, no additional loads due to pipe work or equipment!
A Wall bracket for expansion vessel sizes 8 to 25 litre is required, available as an accessory.

Expansion lines must be dimensioned and installed according to national regulations, according to the requirements of BS EN 12828.
Frost-free conditions are essential.

Incorporate in the circuit, preferably on the suction side of the circulating pump in the return to the boiler, solar collector or refrigeration machine an in-line vessel is required with return temperatures > 70 °C, and it is recommended at return temperatures < 0 °C.
Water top up lines must be incorporated in the circulating water system, not in the expansion line.

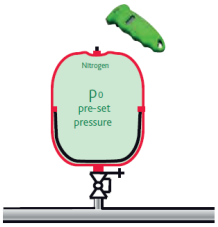
Typical Heating System



Start-up

Isolate the intermediate and expansion vessels drain. Flush the expansion pipe to remove any debris.
Flush the expansion pipe to remove any debris.
Do not exceed the maximum operating pressure (acc. to name plate) as the vessel might burst.
If the pre-set pressure is incorrectly set, the operation of the expansion vessel may be limited and may not perform as intended.

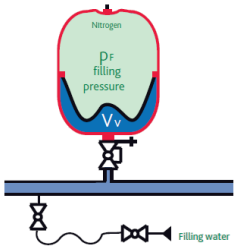
Setting pre-pressure to to minimum system operating pressure.



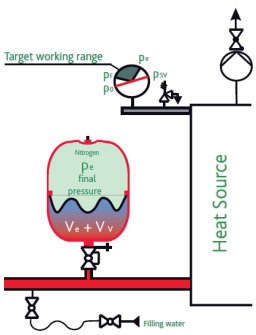
If necessary re-set the factory-set pre-pressure po to the required value (minimum operating pressure of the system), release gas if pressure is too high at gas-filling valve.
Fill with inert gas e.g. using a nitrogen cylinder, if pressure is too low.
Enter newly set pre-pressure on the name plate
Calculation of pre-pressure po
po[bar] = H[m] + 0.2 bar1 + pΔ2 + Δpp3
1 Recommended
2 Evaporation pressure with hot water system >100˚C
3 Differential pressure circulation pump, only to be considered if expansion vessel is installed on the pressure side of the circulation pump.
po ≥ 1 bar (Recommended for lower calculated values)

Start-up

Opening shut off valve



Carefully open the shut off valve and bleed the expansion vessel line and close the drain.
Apply filling pressure pF by filling the water side.
Caution: When filling from a potable system it is imperative to observe the safety instructions and the specific national regulations for the protection of the potable water system.
pF[bar] = ≥po + 0.3 bar
Final Pressure pe



Re-pressurise final pressure pe on the water side (example heating system).

- Run system to maximum advance temperature - thermal degassing.
- Switch off circulation pumps, re-bleed system.
- Refill water up to the final pressure pe pe[bar] = ≤psv - 0.5 bar

The expansion vessel is now ready of service.

Maintenance

When the expansion vessel was initially installed the installer should have obtained from the vessel manufacturer, a copy of the installation instructions, a CE declaration and serial number(s).
One set should have been passed to the installer under a covering letter and one set retained by the manufacturer.
When the system was initially commissioned measurements of temperature and pressure for that part of the system affected by the expansion vessel were taken and recorded, these should be available as a reference.
Expansion vessels are pressure retaining items with one major moving component, the diaphragm or bladder.
The temperature of the system can affect the life of these components.

Part of the vessel is in contact with system water and the other part with air or nitrogen.

How the water treatment in the system has been maintained and controlled will affect the rate of corrosion internally, which cannot easily be determined.

Annual maintenance is required

Before commencing inspection and maintenance of the vessel, check the serial number with the originally supplied by the manufacturer and the CE conformity certificate to determine the age of the vessel and any other relevant information.

External check

If damage (for instance corrosion) is visible, in the case of large vessels repair damage or surface coating; replace smaller vessels.

Diaphragm inspection

If the temperatures and pressures recorded for the system have changed from the initial commissioning or from the last annual inspection it may suggest damage to the diaphragm or bladder.
Extra care should be taken when testing the pressure of the air or nitrogen
Briefly actuate the nitrogen valve.
If water escapes:

- Non replaceable diaphragm, exchange the expansion vessel
- Replaceable bladder, replace bladder.

Checking the water quality
The requirements on closed heating, solar and cooling circuits must be met.

Pressure setting

At a constant temperature with the system operational, continuously monitor the system.
Isolate the expansion vessel from the water system, in case the pressure in the expansion vessel > 4 bar then, first reduce the pressure on the gas filling valve to 4 bar.

1. Drain water side of vessel.

Pre-set pressure po setting see Start-up

Check gas filling valve and, if available, gas pressure gauge for leaks.

When conducting maintenance operations on the gas filling valve the vessel gas system must be de-pressurised to atmospheric pressure.

Filling pressure pF setting see Start-up Final pressure pe setting see Start-up

The expansion vessel is now ready for operation.

Dis-assembly

Before any check-up or dis-assembling of the vessel as well as the parts which are exposed to pressure, the expansion vessel needs to be depressurised to atmospheric pressure.
Isolate the vessel from water system, in case the pressure in the vessel > 4 bar, first reduce pressure via the gas filling valve to 4 bar.
Drain the water side.
Gas-side to de-pressurised via the gas filling valve to atmospheric pressure.
For re-filling vessel see Start-up
If these instruction are not followed it can result in diaphragm failure or injury to personnel.

Pre-operating test

The specific governing local regulations for the operation of pressure equipment must to complied with before operating expansion vessels.

Records

All actions and results taken during an annual inspection or maintenance should be recorded and the records stored safely for future reference.

Life Expectancy

With the unknowns in system operation affecting the expansion vessel and the technically qualified person being unable to check corrosion rates and wall thicknesses it is recommended to change the expansion vessel every 5 years

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MEMBERS AREA

This section of the **flow**tech© website holds information exclusively for members. Members will need to log in to gain access to these pages.

Our member's will be granted exclusive access to our technical resource library. Within this resource is a wide range of product information including data sheets, technical drawings, O&M Manuals and training videos

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At **flow**tech© we operate a network of Service Engineers located throughout the UK who are supported by our offices located in and Greater Manchester. The distribution of engineers means that in the majority of cases we are less than 4 hours away from attending a customer call out.

We place great emphasis on providing technical back up to support our Service Engineers in resolving some difficult operational and technical issues. We pride ourselves on completing a project on time, within budget and never leaving a problem unresolved, or a customer waiting. This quality of service has made us the first choice for our customers.

FOR FURTHER INFORMATION OR ASSISTANCE

contact us

Flowtech Water Solutions are experts in water services and water booster sets. We have continuously supplied a wide range of standard and custom products since being founded in 1996.

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