

expansion vessels



installation, operating and maintenance



altecnic

# expansion vessels

## General Safety Instructions



Reflex diaphragm expansion vessels are pressure devices.

A diaphragm separates the gas and water spaces, giving a gas cushion.

The attached conformity certification certifies the compliance to the Pressure Equipment directive 97/23/EC.

The scope of the sub-assembly can be found in the conformity declaration.

The technical specification selected to fulfill the fundamental safety requirements of annex I of the directive 97/23/EC can be found on the nameplate or conformity declaration.

## 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

Reflex 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 in accordance 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.

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## 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.

**Reflex 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:	$TS_{max}$	+120°C
Min. allowable temperature: (only with addition of anti freeze)	$TS_{min}$	-10°C
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	

## Performance Specification

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!

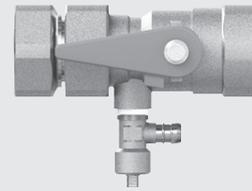
**A Wall bracket** for expansion vessel sizes 8 to 25 litre is required, available as an accessory.

## Performance Specification

### Installation position:

Reflex F	vertical with the straps provided
Reflex N, NG 8-25	vertical
Reflex S 2-40	vertical
Reflex C, EN, R 18-80	vertical
Reflex N, NG 35-80	vertical upright or
Reflex S, SV 50-80	horizontal (water connection down)
Reflex N, NG, S, SV from 100 l	vertical upright
Reflex G	vertical upright

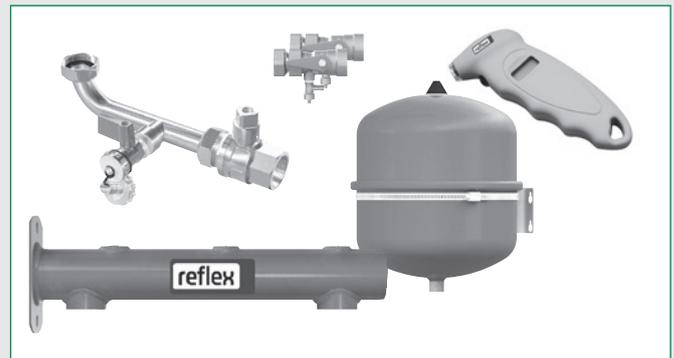
### Shut-off



Provide secure shut-off with drainage following DIN EN 12828 (for all hydraulic systems) for maintenance purposes (available as an option).

With larger systems, the separate arrangement of drainage and shut-off is also possible.

### Accessories



**Expansion lines** must be dimensioned and installed according to national regulations, according to the requirements of BS EN 12828.

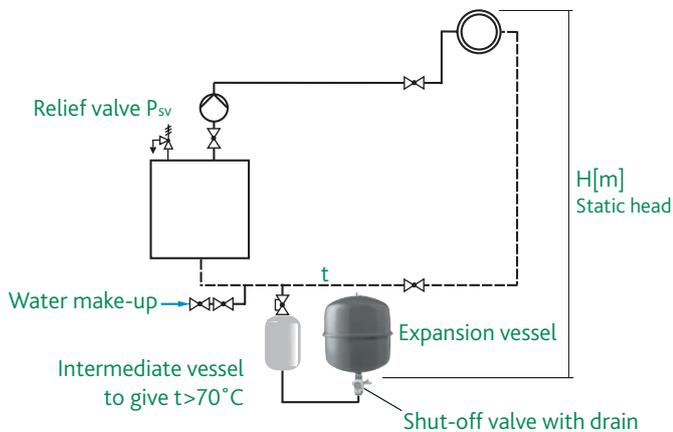
Frost-free conditions are essential.

**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.

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## Typical Heating System



### Start-up

Isolate the intermediate and expansion vessels and drain.

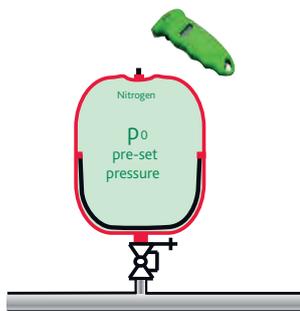
Flush the expansion pipe to remove any debris.

### Warning

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  $P_0$  to minimum system operating pressure.



- If necessary re-set the factory-set pre-pressure  $p_0$  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  $p_0$

$$p_0[\text{bar}] = H[\text{m}] + 0.2 \text{ bar}^1 + p\Delta^2 + \Delta p p^3$$

<sup>1</sup> Recommended

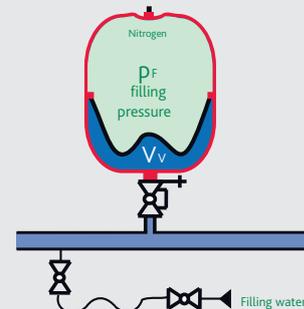
<sup>2</sup> Evaporation pressure with hot water system  $>100^\circ\text{C}$

<sup>3</sup> Differential pressure circulation pump, **only to be considered if expansion vessel is installed on the pressure side of the circulation pump.**

$$p_0 \geq 1 \text{ bar (Recommended for lower calculated values)}$$

### Start-up

#### Opening shut off valve



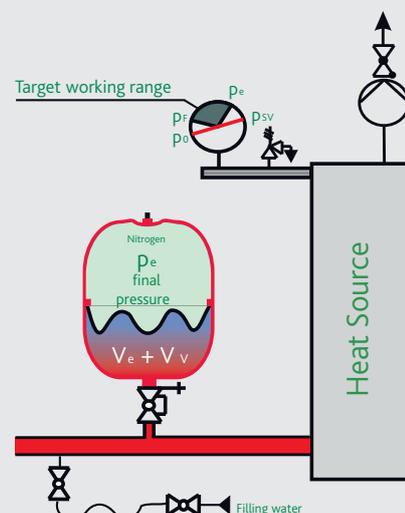
Carefully open the shut off valve and bleed the expansion vessel line and close the drain.

Apply **filling pressure**  $p_f$  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.

$$p_f[\text{bar}] = \geq p_0 + 0.3 \text{ bar}$$

#### Final Pressure $p_e$



Re-pressurise **final pressure**  $p_e$  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  $p_e$

$$p_e[\text{bar}] = \leq p_{sv} - 0.5 \text{ bar}$$

The expansion vessel is now ready of service.

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## 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.

1. 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.
2. Drain water side of vessel.

## Pre-set pressure $p_0$ 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 $p_f$ setting see Start-up

## Final pressure $p_e$ 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.

1. 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.
2. Drain the water side.
3. 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.

## Typical Conformity Certificate - Heating and Solar

<b>Konformitätserklärung für ein Druckgerät (einen Behälter / eine Baugruppe)</b> <b>Declaration of conformity of a pressure equipment (a vessel / an assembly)</b>		Konstruktion, Fertigung, Prüfung von Druckgeräten Design – Manufacturing – Product Verification	
Angewandtes Konformitätsbewertungsverfahren nach Richtlinie für Druckgeräte 97/23/EG des Europäischen Parlaments und des Rates vom 29. Mai 1997 Applied Conformity Assessment according to Pressure Equipment Directive 97/23/EC of the European Parliament and the Council of 29 May 1997			
<b>Druckausdehnungsgefäße</b> <b>Reflex F, N, NG, EN, EN/R, C, S, SV, G</b> universell einsetzbar in Heiz-, Solar- und Kühlwassersystemen <b>Pressure expansion vessels</b> <b>Reflex F, N, NG, EN/R, C, S, SV, G</b> universally applicable in heating, solar and cooling systems			
Typ / type	gemäß Typenschild Behälter according to name plate of vessel		
Serien-Nr. / Serial no.	gemäß Typenschild Behälter according to name plate of vessel		
Herstellungsjahr / Year of manufacture	gemäß Typenschild Behälter according to name plate of vessel		
max. zulässiger Druck (PS) / max. allowable pressure (PS)	gemäß Typenschild Behälter according to name plate of vessel		
Prüfdruck (PT) / Test pressure (PT)	gemäß Typenschild Behälter according to name plate of vessel		
min. / max. zulässige Temperatur (TS) min. / max. allowable temperature (TS)	gemäß Typenschild Behälter according to name plate of vessel		
max. Dauerbetriebstemperatur Voll- / Halbmembrane max. continuous operating temperature membrane / diaphragm	gemäß Typenschild Behälter according to name plate of vessel		
Beschickungsgut Operating medium	Wasser / Inertgas Water / Inertgas		
Normen, Regelwerk Standards	Druckgeräterichtlinie, prEN 13831:2000 oder EN13831:2007 oder AD 2000 oder 2SK-27700 gemäß Typenschild Behälter Pressure Equipment Directive, prEN 13831:2000 oder EN 13831:2007 or AD 2000 or 2SK-27700 according to name plate of vessel		
Druckgerät	<b>Reflex G:</b> <b>Baugruppe</b> Artikel 3 Abs. 2.2 bestehend aus: <b>Behälter</b> Artikel 3 Abs. 1.1 a) 2. Gedankenstrich (Anhang II Diagr. 2) mit <b>Ausrüstung</b> Artikel 3 Abs. 1.4: Vollmembrane und Ventil <b>Ausrüstung</b> Artikel 3 Abs. 1.4: Manometer  <b>Reflex EN, EN/R, C, S ≤ 40 ltr.</b> <b>Behälter</b> Artikel 3 Abs. 1.1 a) 2. Gedankenstrich (Anhang II Diagr. 2) mit <b>Ausrüstung</b> Artikel 3 Abs. 1.4: Vollmembrane und Ventil  <b>Reflex F, N, NG, S &gt; 40 ltr., SV</b> <b>Behälter</b> Artikel 3 Abs. 1.1 a) 2. Gedankenstrich (Anhang II Diagr. 2) mit <b>Ausrüstung</b> Artikel 3 Abs. 1.4: Halbmembrane und Ventil  <b>Reflex G:</b> <b>Assembly</b> article 3 paragraph 2.2 consisting of: <b>vessel</b> article 3 paragraph 1.1 a) 2. indent (Annex II table 2) with <b>accessories</b> article 3 paragraph 1.4: membrane and valve <b>accessories</b> article 3 paragraph 1.4: manometer  <b>Reflex EN, EN/R, C, S ≤ 40 ltr.</b> <b>Vessel</b> article 3 paragraph 1.1 a) 2. indent (Annex II table 2) with <b>accessories</b> article 3 paragraph 1.4: membrane and valve  <b>Reflex F, N, NG, S &gt; 40 ltr., SV.</b> <b>Vessel</b> article 3 paragraph 1.1 a) 2. indent (Annex II table 2) with <b>accessories</b> article 3 paragraph 1.4: diaphragm and valve		
Pressure equipment			
Fluidgruppe / Fluid group	2		
Konformitätsbewertung nach Modul Conformity assessment acc. to module	B+D	Reflex N, NG, EN, EN/R, C, S, SV, G	
	A	Reflex F	
Kennzeichnung gem. Richtlinie 97/23/EG Labelling acc. to Directive 97/23/EC	CE 0045	Reflex N, NG, EN, EN/R, C, S, SV, G	
	CE	Reflex F	
Zertifikats-Nr. der EG-Baumusterprüfung Certificate-No. of EC Type Approval	siehe Anhang 2 see annex 2		
Zertifikats-Nr. QS-System (Modul D) Certificate-No. QA System (module D)	07 202 1403 Z 0250/12/D0045		
Benannte Stelle für Bewertung des QS-Systems Notified Body for certification of QA System	TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31, 22525 Hamburg, Germany		
Registrier-Nr. der Benannten Stelle Registration-No. of the Notified Body	0045		
Hersteller Manufacturer	Der Hersteller erklärt, dass das Druckgerät (der Behälter / die Baugruppe) die Anforderungen der Richtlinie 97/23/EG erfüllt. The manufacturer herewith declares the pressure equipment (the vessel / the assembly) to be in conformity with directive 97/23/EC.		
 <b>Reflex Winkelmann GmbH</b> Gersteinstraße 19 59227 Ahlen - Germany Telefon: +49 2382 7069-0 Telefax: +49 2382 7069-588 E-Mail: info@reflex.de	 Norbert Hülsmann Mitglieder der Geschäftsführung / Members of the Management		 Volker Mauel Mitglieder der Geschäftsführung / Members of the Management

# expansion vessels

## Typical Conformity Certificate - Potable Water

<b>Konformitätserklärung</b> für eine Baugruppe <b>Declaration of conformity</b> of an assembly	Konstruktion, Fertigung, Prüfung von Druckgeräten Design – Manufacturing – Product Verification	
Angewandtes Konformitätsbewertungsverfahren nach Richtlinie für Druckgeräte 97/23/EG des Europäischen Parlaments und des Rates vom 29. Mai 1997 Operative Conformity Assessment according to Pressure Equipment Directive 97/23/EC of the European Parliament and the Council of 29 May 1997		
<p style="text-align: center;"><b>Membran-Druckausdehnungsgefäße:</b>          'refix D', 'DD', 'DT5', 'DT5 (OEM)', 'DE', 'DE junior', 'HW'          universell einsetzbar in Systemen mit Trink- und Nichttrinkwasser</p> <p style="text-align: center;"><b>Diaphragm Pressure Expansion vessels:</b>          'refix D', 'DD', 'DT5', 'DT5 (OEM)', 'DE', 'DE junior', 'HW'          for operation in potable and non-potable water systems</p>		
Angaben zu Behälter, Seriennummer, Typ und Betriebsgrenzen Data about vessel, serial no., type and working limits	gemäß Typenschild according to the name plate	
Beschickungsgut Operating medium	Wasser / Inertgas gemäß Typenschild Water / Inertgas according to the name plate	
Normen, Regelwerk  Standards	Druckgeräte-Richtlinie, prEN 13831:2000 gemäß Typenschild Pressure Equipment Directive, prEN 13831:2000 according to the name plate	
Druckgerät  Pressure equipment	<b>Baugruppe</b> nach Richtlinie 97/23/EG Artikel 3 Abs. 2.2 bestehend aus: Behälter, Membrane, Ventil und Manometer (soweit vorhanden) <b>assembly</b> acc. to Directive 97/23/EC article 3 paragraph 2.2 consisting of: vessel, diaphragm, valve and manometer (as available)	
Fluidgruppe Fluid group	2	
Konformitätsbewertungsverfahren nach Modul Conformity assessment acc. to module	B + D	'refix D, DD, DT5, DT5 (OEM), DE, DE junior, HW'
Kennzeichnung gem. Richtlinie 97/23/EG Label acc. to Directive 97/23/EC	CE 0045	
Zertifikat-Nr. der EG-Baumusterprüfung Certificate No. of EC Type Approval	siehe Anhang 2 see annex 2	
Zertifikat-Nr. der Bewertung des QS-Systems (Modul D) Certificate No. of certification of QS-System (module D)	07 202 1403 Z 0836/9/D0045	
Benannte Stelle für Bewertung des QS-Systems Notified Body for certification of QS-System	TÜV Nord Systems GmbH + Co. KG Große Bahnstraße 31, 22525 Hamburg	
Registrier-Nr. der Benannten Stelle Registration No. of the Notified Body	0045	
Hersteller: Manufacturer:   <b>Reflex Winkelmann GmbH</b> Gersteinstraße 19 59227 Ahlen - Germany Telefon: +49 2382 7069 -0 Telefax: +49 2382 7069 -588 Email: info@reflex.de	Der Hersteller erklärt, daß die Baugruppe die Anforderungen der Richtlinie 97/23/EG erfüllt. The manufacturer herewith certifies this assembly is in conformity with directive 97/23/EC.   Manfred Nussbaumer  Volker Mauel Mitglieder der Geschäftsführung / Members of the Management	

# expansion vessels

## Reflex - Altecnic Code Numbers

Reflex Code	Altecnic Code	Description
	HVC	Heating
	HV	
	HVF	Heating
DE	PV	Potable water
	PVF	Potable water
	PVG	Potable water
	PVK	Potable water
HW	PVH	Potable water - Horizontal
	VF	Potable water
	SF-HV	Heating
DD	PVA	Potable water

E & O.E

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IOM 084 25-01-16

The logo for Altecnic, featuring the word "altecnic" in a lowercase, sans-serif font. The letter "a" is stylized with a small green dot above it.