IMI PNEUMATEX

Squeeze

Expansion vessels with fixed air cushion

From 140 L to 800 L

IMI Hydronic Engineering

Breakthrough Engineering

Squeeze

Squeeze is the product name for pressure expansion vessels with fixed gas charge, within the lower performance range for heating, solar and cooling water systems. Brilliantly simple design, robust construction and operation without auxiliary power pressure.

Key features

- **Membrane according to EN 13831**
- **Wide range of vessel sizes available for different system needs**
  From 140 L to 800 L
- **Brilliantly simple, robust design**
  Operates without auxiliary power.
- **Excellent elasticity**
  Due to fixed gas cushion.
- **Easy installation and movement**
  due to plastic feet covers

Technical description

Applications:
Heating, solar and chilled water systems.

Media:
Non-aggressive and non-toxic system media.
Addition of antifreeze agent up to 50%.

Pressure:
Min. admissible pressure, PSmin: 0 bar
Max. admissible pressure, PS: 6 bar

Temperature:
Max. admissible membrane temperature, TB: 70 °C
Min. admissible membrane temperature, TBmin: 5 °C

Material:
Steel. Color grey.
Lock shield valve DLV: Brass

Transportation and storing:
In frostless, dry places.

Standard:
Constructed according to PED 2014/68/EU.

Warranty:
2-year warranty for the vessel.

Function, Equipment, Features

- SBR membrane according to EN 13831
- Feet for uprigt assembly
- Installation with bottom connection

Calculation

Pressure maintenance for systems TAZ ≤ 100°C
Calculation following EN 12828.
For all special applications like solar systems, district heating systems, systems with temperatures higher than 100°C, cooling systems with temperatures below 5°C please use HySelect software or contact us.

General equations

Vs	Water capacity of the system		**Vs = vs · Q**	vs	*Specific water capacity, table 4.*
			Vs= Known		*System design, content calculation*
				Q	*Installed heat capacity*
Ve	Expansion volume	EN 12828	**Ve = e · Vs**	e	*Expansion coefficient for ts_{max} ,table 1*
Vwr	Water reserve	EN 12828	**Vwr ≥ 0,005 · Vs ≥ 3 L**		
p0	Miniumum pressure [2]		**p0 = Hst/10 + 0,2 bar ≥ pz**	Hst	*Static height*
	Lower limit value for the pressure maintenance			pz	*Minimum required equipment pressure e.g. NPSH requirement for pumps or boilers*
pa	Initial pressure		**pa ≥ p0 + 0,3 bar**		
	Lower threshold for an optimum pressure maintenance				

Squeeze

PF	Pressure factor		**PF = (pe + 1)/(pe - p0)**		
pe	Final pressure				
	Upper threshold for an optimum pressure maintenance.	EN 12828	**pe ≤ psv - $dpsv_c$**	*psvs*	*Response pressure safety valve system*
	Cooling:		**pe ≤ psv - $dpsv_c$**	*$dpsvs_c$*	*= 0,5 bar for psvs ≤ 5 bar [4]*
				$dpsvs_c$	*= 0,1 · psvs for psvs > 5 bar [4]*
VN	Nominal volume of the expansion vessel [5]	EN 12828	**VN ≥ (Ve + Vwr + 1,1 · Vgsolar [6] + 5 [3]) · PF**	*Vgsolar*	*Collector volume [6]*

1) Q ≤ 30 kW: X = 3 | 30 kW < Q ≤ 150 kW: X = 2 | Q > 150 kW: X = 1,5
2) The formula for the minimum pressure p0 applies to the installation of the pressure maintenance on the suction side of the circulation pump. In case of a pressure-side installation p0 is to be increased by the pump pressure Δp.
3) Add 2 litres when a Vento is installed in the system.
4) The safety valves must operate within these limits.
5) Please select a vessel which has an equal or higher nominal content.
6) In solar systems to ENV12977-1: collector volume Vgsolar that can evaporate when not in operation; otherwise Vgsolar = 0.

Our calculation program HySelect is based on an advanced calculation method and data base, therefore results may vary.

Table 1: e expansion coefficient

t (TAZ, ts_{max}, tr, ts_{min}), °C		20	30	40	50	60	70	80	90	100	105	110
e Water	= 0 °C	0,0016	0,0041	0,0077	0,0119	0,0169	0,0226	0,0288	0,0357	0,0433	0,0472	0,0513
e % weight MEG*												
30 %	= -14,5 °C	0,0093	0,0129	0,0169	0,0224	0,0286	0,0352	0,0422	0,0497	0,0577	0,0620	0,0663
40 %	= -23,9 °C	0,0144	0,0189	0,0240	0,0300	0,0363	0,0432	0,0505	0,0582	0,0663	0,0706	0,0750
50 %	= -35,6 °C	0,0198	0,0251	0,0307	0,0370	0,0437	0,0507	0,0581	0,0660	0,0742	0,0786	0,0830
e % weight MPG**												
30 %	= -12,9 °C	0,0151	0,0207	0,0267	0,0333	0,0401	0,0476	0,0554	0,0639	0,0727	0,0774	0,0823
40 %	= -20,9 °C	0,0211	0,0272	0,0338	0,0408	0,0481	0,0561	0,0644	0,0731	0,0826	0,0873	0,0924
50 %	= -33,2 °C	0,0288	0,0355	0,0425	0,0500	0,0577	0,0660	0,0747	0,0839	0,0935	0,0985	0,1036

Table 4: vs approx. water capacity * of central heatings referred to the installed heat capacity Q**

ts_{max} | tr	°C	90 | 70	80 | 60	70 | 55	70 | 50	60 | 40	50 | 40	40 | 30	35| 28
Radiators	vs liter/kW	14,0	16,5	20,1	20,6	27,9	36,6	-	-
Flat radiators	vs liter/kW	9,0	10,1	12,1	11,9	15,1	20,1	-	-
Convectors	vs liter/kW	6,5	7,0	8,4	7,9	9,6	13,4	-	-
Air handlers	vs liter/kW	5,8	6,1	7,2	6,6	7,6	10,8	-	-
Floor heating	vs liter/kW	10,3	11,4	13,3	13,1	15,8	20,3	29,1	37,8

*) MEG = Mono-Ethylene Glycol
**) MPG = Mono-Propylene Glycol
***) Water capacity = heat generator + distribution net + heat emitters

Table 5: DNe standard values for expansion pipes with Squeeze

Length up to approx. 30 m	DNe	20	25	32
Heating:				
EN 12828	Q | kW	1000	1700	3000
Cooling:				
$ts_{max} \leq 50$ °C	Q | kW	1600	2700	4800

Temperatures

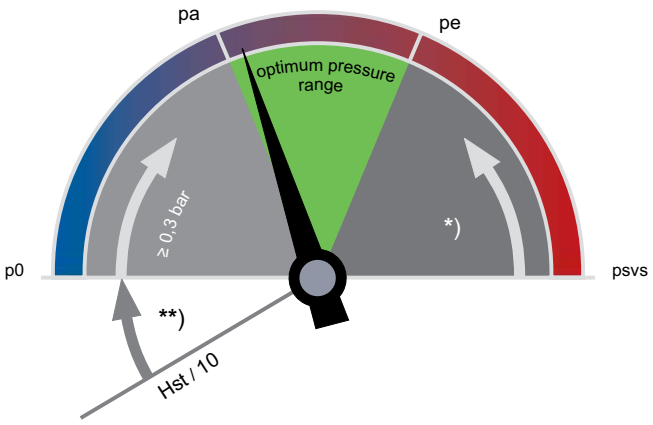
ts_{max} **Maximum system temperature**
Maximum temperature for the calculation of the volume expansion. For heating systems the dimensioned flow temperature at which a heating system is to be operated with the lowest outside temperature to be assumed (standard outside temperature according to EN 12828). For cooling systems the max. temperature that is achieved due to the operation mode or standstill, for solar systems the temperature up to which an evaporation is to be avoided.

ts_{min} **Lowest system temperature**
Lowest temperature for calculating expansion volumes. The lowest system temperature is equal to the freezing point. It is dependant on the percentage of antifreeze additives. For water without additives $ts_{min} = 0$.

tr **Return temperature**
Return temperature of the heating system with the lowest outside temperature to be assumed (standard outside temperature according to EN 12828).

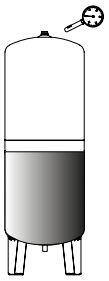
TAZ **Safety temperature limiter | Safety temperature controller | Temperature limit**
Safety device according to EN 12828 for the temperature protection of heat generators. If the set temperature limit is exceeded the heating is turned off. Limiters are locked, controllers automatically release the heat supply if the set temperature falls short. Setting value for systems according to EN 12828 ≤ 110 °C.

Precision pressure maintenance



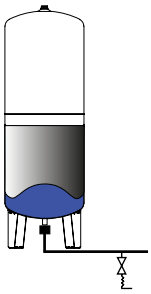
*)
≥ psvs*0.9 ≥ 0.5
**)
≥ 0.2 bar EN12828

p0 Minimum pressure



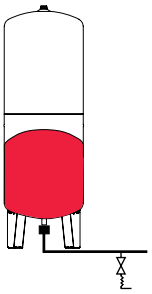
Squeeze
p0 is set as pre set pressure on the gas side.

pa Initial pressure



Squeeze
pa is the cold fill pressure which determines the water reserve:
pa ≥ p0 + 0,3 bar;
water make-up «on»: pa – 0,2 bar.

pe Final pressure



Squeeze
pe is reached after heating up to ts_{max}.
pe ≤ psvs – $dpsvs_c$

Quick selection

Heating systems TAZ ≤ 100°C, without addition of antifreeze, EN 12828.
For an exact calculation please use HySelect software.

	psv = 3,0 bar			psv = **3,0** bar		
	Hst ≤ 7 m ≥ p0 = **1,0** bar			Hst ≤ 12 m ≥ p0 = **1,5** bar		
	Radiators	Flat radiators		Radiators	Flat radiators	
	90 | 70	90 | 70	70 | 50	90 | 70	90 | 70	70 | 50
Q [kW]	**Nominal volume VN** [liter]			**Nominal volume VN** [liter]		
70	140	140	140	140	140	140
80	140	140	140	200	140	140
90	140	140	140	200	140	140
100	140	140	140	200	140	140
150	200	140	140	300	200	200
200	**300**	200	200	400	300	300
250	400	300	300	500	400	300
300	400	300	300	600	400	400
400	600	400	300	800	500	500
500	800	500	400	1000	800	600
600	800	500	500	1500	800	800
700	1000	600	600	1500	1000	800
800	1500	800	600	1500	1000	1000
900	1500	800	800	2000	1500	1000
1000	1500	1000	800	2000	1500	1500

Example
Q = 200 kW
psv = 3 bar
Hst = 7 m
Radiators 90 | 70 °C

Selected:
Squeeze SQ 300.3
p0 = 1 bar
Reduce the factory set preset pressure from 1,5 bar to 1 bar!

Note for TAZ above 100 °C
Above 100°C the static height Hst decreases in the quick selection table.
TAZ = 105°C: Hst – 2 m
TAZ = 110°C: Hst – 4 m

Pre-set pressure setting p0
p0 = (Hst/10 + pv) + 0,3 bar
Recommended: p0 ≥ 1 bar

Filling pressure, initial pressure
pa ≥ p0 + 0,3 with cold, but vented system

Equipment

Lock shield valve DLV
Secured lock shield valve with draining for expansion vessels according to EN 12828, DLV 25 up to VN 800 litres.

Expansion pipe
According to table 5.

Pleno
Water make-up as pressure maintenance monitoring device according to EN 12828.
Conditions:
• Pleno PI without pump: required fresh water pressure: pw ≥ p0 + 1,5 | pw ≤ 10 bar,
• Pleno PI 6, PI 9 with pump: pa Squeeze within the working pressure range dpu of the Pleno.

Vento
Degassing and central venting.
Conditions:
• pe, pa Squeeze within the working pressure range dpu of the Vento,
• Vs Vento ≥ Vs water capacity of the system.

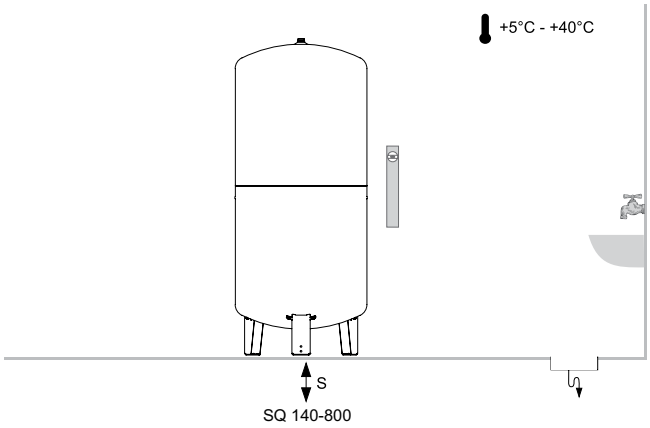
Zeparo
Air vent Zeparo ZUT or ZUP at each high point for venting during the filling and during the draining process. Separator for dirt and magnetite in each system in the main return to the heat generator. If no central degassing (Vento V Connect) is installed a micro bubble separator can be installed in the main flow if possible before the circulation pump.

The static height, Hst_m, according to the following table above the micro bubble separators, must not be exceeded.

ts_{max} | °C	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**	**10**
Hst_m | m	15,0	13,4	11,7	10,0	8,4	6,7	5,0	3,3	1,7

Further accessories, product and selection details: Datasheets *Pleno, Vento, Zeparo* and *Accessories.*

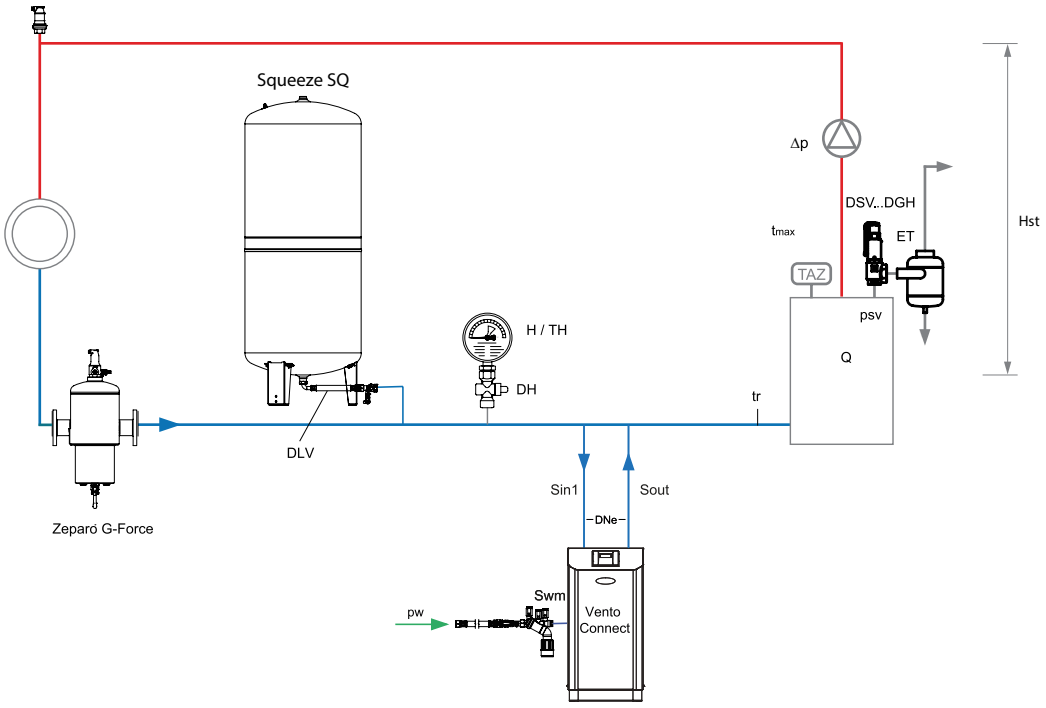
Installation



Application examples

Squeeze SQ

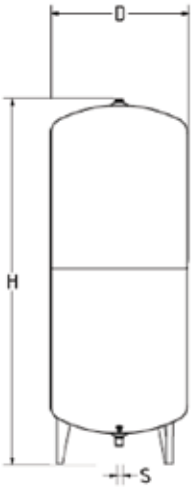
For heating system up to approx. 700 kW
(May require changes to meet local legislation)



1. Water make-up connection

Vento Connect for the central venting and degassing, with water make-up as pressure maintenance monitoring device according to EN 12828.
Zeparo G-Force for the central separation of sludge.
Zeparo ZUT for automatic venting during filling and during draining.
Further accessories, product and selection details, see: Datasheet *Pleno*, *Zeparo* and *Accessories.*

Articles



Squeeze SQ
Slim, cylindrical model

Type	VN [l]	p0 [bar]	D	H	H***	m [kg]	S	EAN	Article No
6 bar (PS)									
SQ 140.6	140	3,5	420	1278	1489	25	R1	7640161636361	301011-31200
SQ 200.6	200	3,5	500	1380	1565	33	R1	7640161636378	301011-31400
SQ 300.6	300	3,5	560	1488	1692	39	R1	7640161636385	301011-31600
SQ 400.6	400	3,5	620	1540	1760	57	R1	7640161636392	301011-31700
SQ 500.6	500	3,5	680	1629	1859	66	R1	7640161636408	301011-31800
SQ 600.6	600	3,5	740	1606	1874	76	R1	7640161636415	301011-31900
SQ 800.6	800	3,5	740	2100	2360	100	R1	7640161636422	301011-32200

VN = Nominal volume
**) Tolerance 0 /+35
***) Max height when vessel is tilted

Accessories for pressure maintenance

Technical description – Lock shield valve

Applications:
Heating, solar and cooling water systems.
Deployment in systems according to EN 12828.

Media:
Non-aggressive and non-toxic system media.
Addition of antifreeze agent up to 50%.

Functions:
Shut-off. Maintenance and disassembly of expansion vessels.

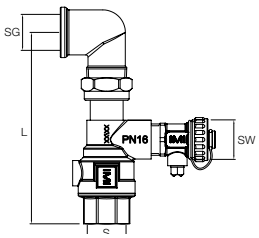
Pressure:
Min. admissible pressure, PSmin: 0 bar
Max. admissible pressure, PS: 16 bar

Temperature:
Max. admissible temperature, TS: 120 °C
Min. admissible temperature, TSmin: -10 °C

Material:
Brass.

General:
Can only be closed with an allen key which is include in the supply, ball valve with DN 15 hose connection for fast draining.

Lock shield valve



Connection set DLV A
Female thread on both sides, 90° bend with threaded seal for direct connection to Statico SU expansion vessels.

Type	PS [bar]	L	m [kg]	S	SG	SW	EAN	Article No
DLV 25 A	10	135	0,8	Rp1	Rp1	G3/4	7640161637214	30101050601