reflex
Thinking solutions.

Expansion vessels

Reflex, Refix

From the initial idea **to the solution**

Reflex - The Company

Smooth operation in supply engineering thanks to system solutions

Reflex Winkelmann GmbH belongs to the Heating&Water division of the Winkelmann Group with 4,200 employees worldwide. The company is a leading brand manufacturer and solution provider for the smooth operation of water-carrying systems in supply engineering and modern building services. In addition to expansion vessels, we develop, manufacture and distribute innovative components and complete solutions for pressure-maintaining, water make-up, degassing, water treatment and storage as well as heat exchangers.

Extensive Product Range

Reflex represents a large range of products and services, offering innovative systems for heating, cooling and hot-water supply and a multitude of other services.

The Reflex product range comprises:
- Expansion Vessels
- Pressurisation Systems
- Water Make-Up Systems & Water Treatment
- Degassing Systems & Separation Technology
- Hot Water Storage Tanks & Heat Exchangers

For constant reliable heat and water supply.

www.reflex.de

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Expansion Vessels

Reflex: Heating, chilled water and solar applications

3 bar

F – Diaphragm

F8-24
Diaphragm
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N – Diaphragm

N8-35
Diaphragm
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C – Bladder

C8-80
Non-replaceable
Butyl bladder
Page 8

6 bar

N & NG – Diaphragm

NG 8-35 litres

NG 50-140 litres

N 200-1000 litres
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G – Bladder

G 100-5000 litres
Page 10

10 bar

S – Diaphragm

S 2-33 litres
Bladder

S 50-600 litres
Diaphragm
Page 9

S/V 18-33 litres
Diaphragm
Page 9

G – Bladder

G 100-5000/16 bar
G 100-5000/10 bar
optional: 25 bar
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CE

V Intermediate Tank

without membrane
V 500–5000 litres → 6 bar/120 °C
V 6–5000 litres → 10 bar/120 °C
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CE

Other temperatures and working pressures optionally available

Refix: Potable water and service water applications

DD
Bladder

DD 2–33/10 bar
DD 8/25 bar
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DT
Bladder

DT 60–3000/10 bar
DT 80–3000/16 bar
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For potable water, pressurising and water-heating systems according to DIN 1988

C-DE
Bladder

C-DE 8–80/10 bar
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DE
Bladder

DE 2–5000/10 bar
DE 8–5000/16 bar
DE 8–3000/25 bar
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HW
Bladder

HW 25–100/10 bar
Page 20

DC
Diaphragm

DC 25–600/10 bar
Page 15






CE WRAS APPROVED PRODUCT DVGW ACS

Only for systems not required to meet DIN 1988, such as fire-fighting and service water systems, underfloor heating and geothermal installations.

Water shock arrestor

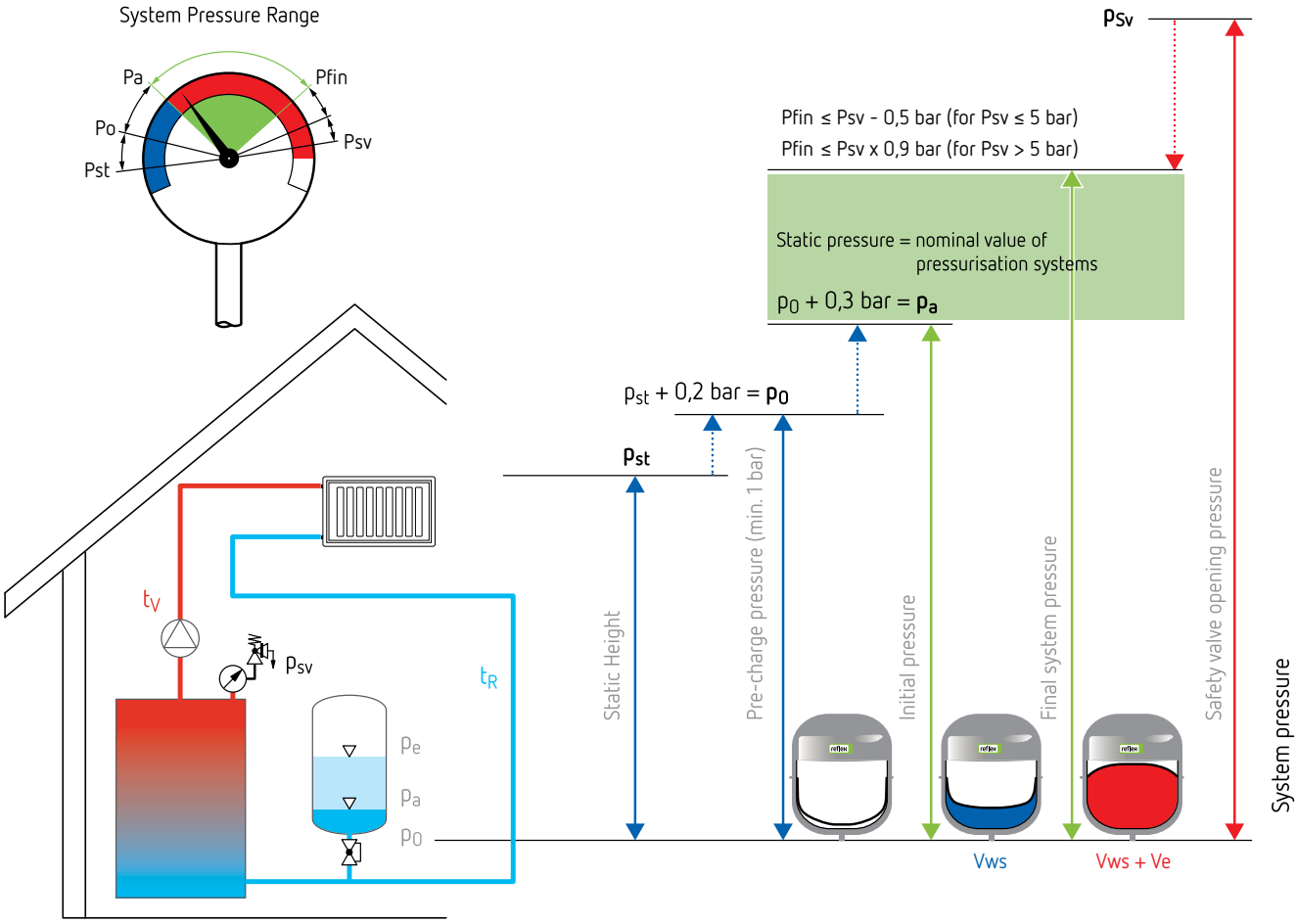
WD
Diaphragm

0.165 litre/10 bar

1 litre/10 bar

CE WRAS APPROVED PRODUCT ACS

Working Principle



Pressurisation systems - tasks

Pressurisation systems have a central relevance in heating and cooling circuits and must essentially fulfil three fundamental tasks:

1. Maintaining the pressure within permissible limits at every point of the system, that is, the permissible working pressure must not be exceeded as well as maintaining a minimum pressure to prevent vacuum, cavitation and evaporation of the system liquid, e.g. in circuits with superheated water, solar systems
2. To prevent a negative pressure at the highest points of the installation in order to avoid the intrusion of air into the piping network
3. Compensation of volume fluctuations of the heating or cooling water due to temperature fluctuations.
4. Providing a water seal to prevent system-related water losses.

Careful calculation, commissioning and maintenance are the prerequisite for the correct functioning of the overall system.

$Ve = Vs \times n$

$Vws = 0{,}005 \times Vs$

$$DF = \frac{Pfin - P0}{Pfin + 1}$$

$$Vn \geq \frac{Ve + Vws}{DF}$$

$Pfin = Psv - 0{,}5$ bar ($Psv < 5$ bar)

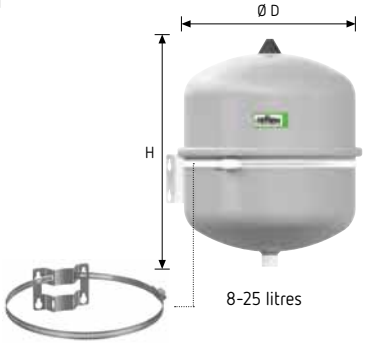
$Pfin = Psv - 0{,}1 \times Psv$ bar ($Psv > 5$ bar)

Vn = Nominal volume, litres
Ve = Expanded volume, litres
Vws = Water reserve, litres
Vs = Total water content, litres
n = Expansion coefficient (Eg.: for 90°C, e = 0,0355)
DF = Acceptance factor

Pst = Static height
P0 = Pre-charge pressure
Pa = Initial pressure
Pfin = Final system pressure
Psv = Safety valve opening pressure

Reflex N & NG

- For heating and chilled water applications
- Threaded connections
- Non-replaceable diaphragm, according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating with attractive new colour
- Factory pre-pressurised gas chamber (Nitrogen)



8-25 litres

35-250 litres

300-1000 litres

Option
Wall-hung bracket
Article No: 7611000

CE

	Type 3 bar / 120°C	Article No Grey	Article No White	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
3 bar	N 8	8202500	7202800	12	96	1.70	206	305	-	R 3/4	1.5
	N 12	8203300	7203500	12	60	2.20	272	313	-	R 3/4	1.5
	N 18	8204300	7204400	12	60	2.90	308	361	-	R 3/4	1.5
	N 25	8206300	7206400	12	48	3.58	308	481	-	R 3/4	1.5
	N 35	8208400	7208500	12	24	5.02	376	465	130	R 3/4	1.5

	Type 6 bar / 120°C	Article No Grey	Article No White	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
6 bar	NG 8	8230100	7230107	10	96	1.6	206	305	-	R 3/4	1.5
	NG 12	8240100	7240107	10	72	2.4	280	275	-	R 3/4	1.5
	NG 18	8250100	7250107	10	56	3.4	280	380	-	R 3/4	1.5
	NG 25	8260100	7260107	10	42	4.2	280	490	-	R 3/4	1.5
	NG 35	8270100	7270107	10	24	4.8	354	460	130	R 3/4	1.5
	NG 50	8001011	7001100	11	24	5.7	409	469	158	R 3/4	1.5
	NG 80	8001211	7001300	11	12	8.7	480	565	166	R 1	1.5
	NG 100	8001411	7001500	11	10	11.4	480	670	166	R 1	1.5
	NG 140	8001611	7001700	11	8	13.1	480	912	175	R 1	1.5
	N 200	8213300	-	18	4	22.0	634	758	205	R 1	1.5
	N 250	8214300	-	18	4	24.7	634	888	205	R 1	1.5
	N 300	8215300	-	18	-	27.0	634	1092	235	R 1	1.5
	N 400	8218000	-	18	-	47.0	740	1102	245	R 1	1.5
	N 500	8218300	-	18	-	52.0	740	1312	245	R 1	1.5
	N 600	8218400	-	18	-	66.0	740	1531	245	R 1	1.5
	N 800	8218500	-	18	-	96.0	740	1996	245	R 1	1.5
	N 1000	8218600	-	18	-	118.0	740	2406	245	R 1	1.5

5 bar
Safety Valve - Rp 1/2"
Article No: 9125465

10 bar
Manometer - Rp 1/4"
Article No: 9117007

Exvoid-T Airvent
Article No: 9250038

Holder with
multiple connections

Lockshield cap valve

Reflex Lockshield Cap Valve

- Shut-off device for inspection and removal of expansion vessels
- Including drain valve
- According to DIN EN 12828
- PN 10 / 120°C

	Article No	Material Group
R 3/4 x 3/4	7613000	84
R 1 x 1	7613100	84

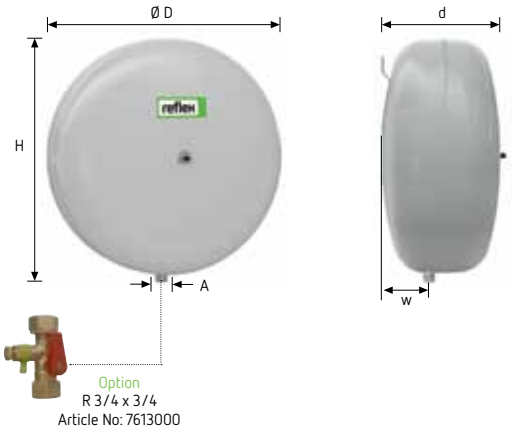
Reflex Wall hung holder for vessels 8 - 25 litres

- Holder with multiple connections

	Article No	Material Group
8 - 25 l	7612000	75

Reflex C

- For heating and chilled water applications
- Suitable for anti-frost mixture up to 50%
- Provided with suspension bracket for easy installation
- Non-replaceable **butyl** bladder according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating with attractive new colour
- Factory pre-pressurised gas chamber (Nitrogen)

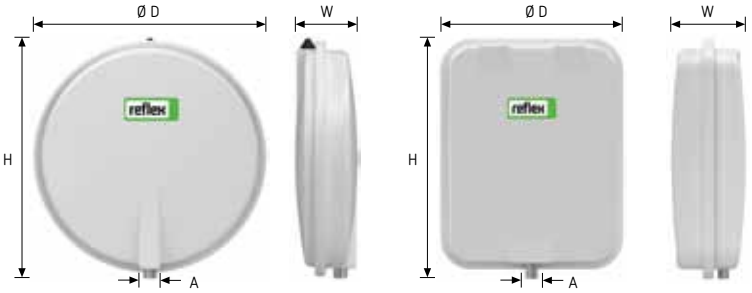


CE

	Type 3 bar / 120°C	Article No Grey	Material Group	PU	Weight kg	Ø D mm	H mm	d mm	W mm	A	Pre-charge pressure bar
3 bar	C 8	8280000	17	96	2.8	280	287	163	52	G 1/2	1.0
	C 12	8280100	17	60	3.2	354	362	168	64	G 1/2	1.0
	C 18	8280200	17	42	4.7	354	362	222	76	G 3/4	1.0
	C 25	8280300	17	42	5.5	409	419	239	93	G 3/4	1.0
	C 35	8280400	17	24	7.3	480	457	240	97	G 3/4	1.0
	C 50	8280500	17	20	8.1	480	457	318	125	G 3/4	1.5
	C 80	8280600	17	8	14.5	634	612	325	135	G 3/4	1.5

Reflex F

- Flat vessel for heating (built-in boiler applications)
- Non-replaceable diaphragm according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- From 18 litres with suspension brackets
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating
- Factory pre-pressurised gas chamber (Nitrogen)



8 litres 12-24 litres

CE

	Type 3 bar / 120°C	Article No	Material Group	PU	Weight kg	H mm	D mm	W mm	A	Pre-charge pressure bar
3 bar	F 8	9600011	15	54	6.3	389	389	88	G 3/8	0.75
	F 12	9600030	15	36	7.7	444	350	108	G 1/2	1.0
	F 15	9600040	15	36	8.2	444	350	134	G 3/4	1.0
	F 18	9600000	15	28	8.7	444	350	158	G 3/4	1.0
	F 24	9600010	15	25	9.4	444	350	180	G 3/4	1.0

Reflex S

- For solar, heating and chilled water applications
- Suitable for anti-frost mixture up to 50%
- Non-replaceable bladder up to 33 litres, Non-replaceable diaphragm 50-600 litres, according to DIN EN 13831 norm part 3,
- Threaded connections
- Max. operating temperature 70°C
- 33 litres with suspension brackets, from 50 litres with feet
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating with attractive new colour
- Factory pre-pressurised gas chamber (Nitrogen)

2-33 litres

50-250 litres

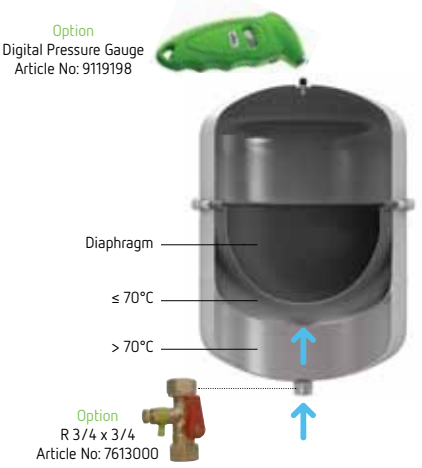
300-600 litres

CE

	Type 10 bar / 120°C	Article No Grey	Article No White	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
10 bar	S 2	8707700	-	14	280	1.0	132	260	-	G 3/4	0.5
	S 8	8703900	9702600	14	96	2.5	206	335	-	G 3/4	1.5
	S 12	8704000	9702700	14	72	2.5	280	300	-	G 3/4	1.5
	S 18	8704100	9702800	14	56	3.2	280	410	-	G 3/4	1.5
	S 25	8704200	9702900	14	42	4.5	354	520	-	G 3/4	1.5
	S 33	8706200	9706300	14	24	6.3	409	455	-	G 3/4	1.5
	S 50	8209500	-	19	20	9.5	480	469	158	R 3/4	3.0
	S 80	8210300	-	19	12	14.6	480	565	166	R 1	3.0
	S 100	8210500	-	19	10	15.5	480	670	166	R 1	3.0
	S 140	8211500	-	19	6	17.4	634	941	210	R 1	3.0
	S 200	8213400	-	19	-	35.6	634	758	205	R 1	3.0
	S 250	8214400	-	19	-	40.8	634	888	205	R 1	3.0
	S 300	8215400	-	19	-	47.0	740	1092	235	R 1	3.0
	S 400	8219000	-	19	-	61.0	740	1102	245	R 1	3.0
	S 500	8219100	-	19	-	72.0	740	1321	245	R 1	3.0
	S 600	8219200	-	19	-	87.0	740	1559	245	R 1	3.0

Reflex S/V

- Combination tank integrating a solar expansion vessel with an intermediate vessel in one single vessel for solar heating and chilled water applications
- Suitable for anti-frost mixture up to 50%
- Noticeable reduction of space and installation costs
- Non-replaceable diaphragm according to DIN EN 13831 norm part 3
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Up to 25/8 with Wall-hung lug, 33 litres with suspension brackets
- Max. operating pressure : 10 bar
- Operating temperature range
  -10 bar / +70°C (diaphragm)
  -10 bar / +120°C (tank)
- Factory pre-pressurised gas chamber (Nitrogen)



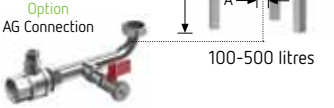

18-33 litres

CE

	Type 10 bar / 120°C	Article No Grey	Article No White	Material Group	Volume Solar/intermediate litres	Weight kg	Ø D mm	H mm	A	Pre-charge pressure bar
10 bar	S/V 18/6	9702410	8702410	14	18/6	4.2	280	462	G 3/4	2.5
	S/V 25/8	9702510	8702510	14	25/8	5	280	609	R 3/4	2.5
	S/V 33/12	9706910	8706910	14	33/12	7	354	594	R 3/4	2.5

Reflex G

- For heating and chilled water applications
- Replaceable bladder, according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Inspection opening (Above 1000 litres Ø 1000 mm)
- Factory-mounted pressure gauge
- Threaded connections up to 1000 litres
- Flanged connections above 1000 litres
- 3000 to 10000 litres with upper flange
- Durable epoxy coating with attractive new colour
- Factory pre-pressurised gas chamber (Nitrogen)



100-500 litres

600-1000 litres
Ø 740

1000-10000 litres
Ø 1000

CE

	Type 6 bar / 120°C	Article No Grey	Material Group	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
6 bar	G 100	8519000	21	17.0	480	870	153	G 1	3.5
	G 200	8519100	21	37.0	634	972	144	G 1 1/4	3.5
	G 300	8519200	21	42.0	634	1272	144	G 1 1/4	3.5
	G 400	8521605	21	43.0	740	1253	146	G 1	3.5
	G 500	8521705	21	51.0	740	1473	146	G 1	3.5
	G 600	8522605	21	66.0	740	1718	146	G 1	3.5
	G 800	8523610	21	94.0	740	2183	146	G 1	3.5
	G 1000 Ø 740	8546605	21	150.0	740	2593	146	G 1	3.5
	G 1000 Ø 1000	8524605	22	228.0	1000	1973	307	DN 65/PN 6	3.5
	G 1500	8526605	22	280.0	1200	1971	305	DN 65/PN 6	3.5
	G 2000	8527605	22	250.0	1200	2431	305	DN 65/PN 6	3.5
	G 3000	8544605	22	620.0	1500	2480	334	DN 65/PN 6	3.5
	G 4000	8529605	22	770.0	1500	3053	334	DN 65/PN 6	3.5
	G 5000	8530605	22	849.0	1500	3588	344	DN 65/PN 6	3.5
	G 8000	Per Request	22	979.0	1500	5404	236	DN 100/PN16	3.5
	G 10000	Per Request	22	1166.0	1500	6560	236	DN 100/PN16	3.5

	Type 10 bar / 120°C	Article No Grey	Material Group	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
10 bar	G 100	8518000	21	14.9	480	870	153	G 1	3.5
	G 200	8518100	21	33.4	634	972	144	G 1 1/4	3.5
	G 300	8518200	21	34.6	634	1273	144	G 1 1/4	3.5
	G 400	8521005	21	51.0	740	1245	133	G 1 1/4	3.5
	G 500	8521006	21	57.1	740	1475	133	G 1 1/4	3.5
	G 600	8522006	21	118.0	740	1859	263	G 1 1/2	3.5
	G 800	8523005	21	166.0	740	2324	263	G 1 1/2	3.5
	G 1000 Ø 740	8546005	21	174.0	740	2805	263	G 1 1/2	3.5
	G 1000 Ø 1000	8524005	22	335.0	1000	2001	286	DN 65/PN 16	3.5
	G 1500	8526005	22	390.0	1200	1991	291	DN 65/PN 16	3.5
	G 2000	8527005	22	485.0	1200	2451	291	DN 65/PN 16	3.5
	G 3000	8544005	22	830.0	1500	2532	320	DN 65/PN 16	3.5
	G 4000	8529005	22	1064.0	1500	3107	320	DN 65/PN 16	3.5
	G 5000	8530005	22	1274.0	1500	3642	320	DN 65/PN 16	3.5
	G 8000	8545000	22	1470.0	1500	5404	236	DN 100/PN 16	3.5
	G 10000	8533000	22	1750.0	1500	6560	236	DN 100/PN 16	3.5

Reflex G

1000-10000 litres
Ø 1000

MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Reflex G
- Consists of an electrode and relay (factory-mounted)
- Operates 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel

Article No : 7857700 **Material Group** : 86

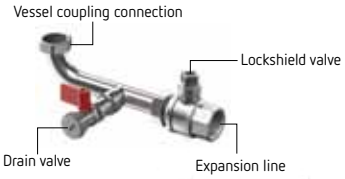
Relay
Wall mounted (on site)

Electrode
Factory mounted

	Type 16 bar / 120°C	Article No Grey	Material Group	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
16 bar	G 100	8518400	21	25.0	480	946	234	DN25/PN 16	3.5
	G 200	8518500	21	57.0	634	1.060	221	DN25/PN 16	3.5
	G 300	8518600	21	66.0	634	1.364	221	DN25/PN 16	3.5
	G 400	8510206	21	118.0	740	1.405	201	DN 40/PN 16	3.5
	G 500	8518700	21	130.0	740	1.655	201	ON 40/PN 16	3.5
	G 600	8522007	21	158.0	740	1.859	201	DN 40/PN 16	3.5
	G 800	8523906	21	221.0	740	2.324	201	DN 40/PN 16	3.5
	G 1000	8546906	21	260.0	740	2.805	201	DN 40/PN 16	3.5
	G 1000	8524205	22	240.0	1.000	2.031	276	DN 65/PN 16	3.5
	G 1500	8526305	22	650.0	1.200	2.021	281	DN 65/PN 16	3.5
	G 2000	8527100	22	505.0	1.200	2.481	281	DN 65/PN 16	3.5
	G 3000	8544705	22	805.0	1.500	2.550	310	DN 65/PN 16	3.5
	G 4000	8529405	22	890.0	1.500	3.110	310	DN 65/PN 16	3.5
	G 5000	8529705	22	1.020.0	1.500	3.645	310	DN 65/PN 16	3.5

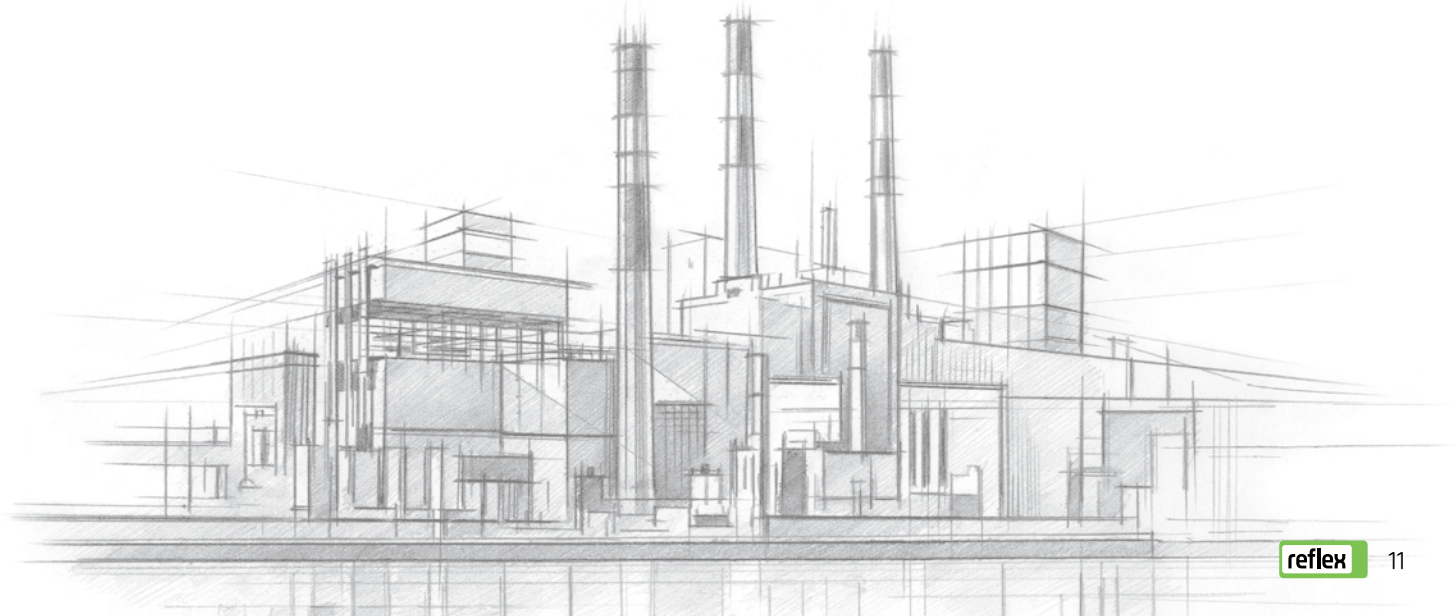
Options

- Operation pressure : 25 bar
- Flanged connection :
  For G 1000 - 5000 tanks: DN 150, DN 200
  For G 8000 - 10000 tanks: DN 300



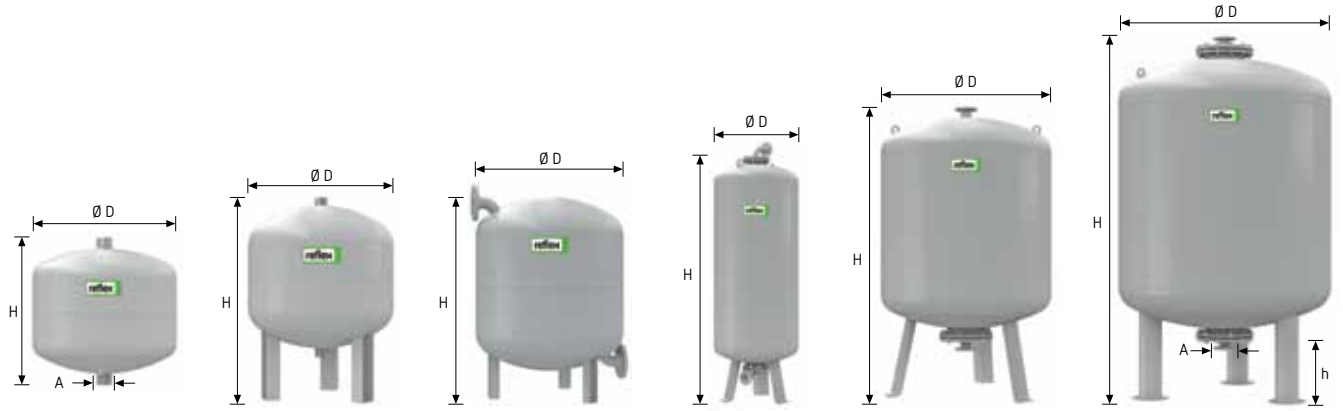
AG Connection

Article	Article No	Suitable For Model
R 1	9119204	G 400 - G 1000 / Ø 740
R 1 1/4	9119205	G 100 - G 500
R 1 1/2	9119206	G 600 - G 1000 / Ø 740



Reflex V Intermediate Tank

- Necessary for installations subject to norm EN 13831 with return temperatures > 70°C or cooling systems at ≤ 0°C
- To avoid faster aging of diaphragm/bladder when subjected to higher temperatures (heating) and to prevent condensation water from freezing (cooling)
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Flanged water connections: 200 litres and above
- Durable epoxy coating with attractive new colour



6-20 litres | 40-60 litres | 200-350 litres | 500-750 litres | 1000-2000 litres | 3000-5000 litres

CE

	Type 6 bar / 120°C	Article No Grey	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A
6 bar	V 500	8852800	24	-	160.0	750	1632	210	DN 40/PN 6
	V 750	8851800	24	-	205.0	750	2323	210	DN 40/PN 6
	V 1000	8851905	24	-	310.0	1000	2020	305	DN 65/PN 6
	V 1500	8852305	24	-	445.0	1200	2020	305	DN 65/PN 6
	V 2000	8852405	24	-	545.0	1200	2478	305	DN 65/PN 6
	V 3000	8852505	24	-	775.0	1500	2556	340	DN 65/PN 6
	V 4000	8853405	24	-	1060.0	1500	3131	340	DN 65/PN 6
	V 5000	8854805	24	-	1095.0	1500	3666	340	DN 65/PN 6

	Type 6 bar / 120°C	Article No Grey	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A
10 bar	V 6	8403100	24	96	2.0	206	244	-	R 3/4
	V 12	8403200	24	72	3.0	280	287	-	R 3/4
	V 20	8402000	24	42	4.0	280	360	-	R 3/4
	V 40	8403400	24	18	7.8	409	562	113	R 1
	V 60	8402600	24	12	23.0	409	732	172	R 1
	V 200	8701800	24	-	43.0	634	901	142	DN 40/PN 16
	V300	8701900	24	-	48.0	634	1201	142	DN 40/PN 16
	V 350	8702400	24	-	51.0	640	1341	210	DN 40/PN 16
	V 1000	8400205	24	-	560.0	1000	2055	286	DN 65/PN 16
	V 1500	8400305	24	-	780.0	1200	2045	284	DN 65/PN 16
	V 2000	8400405	24	-	940.0	1200	2055	284	DN 65/PN 16
	V 3000	8400505	24	-	1405.0	1500	2598	313	DN 65/PN 16
	V 4000	8400605	24	-	1930.0	1500	3178	313	DN 65/PN 16
	V 5000	8400705	24	-	2015.0	1500	3173	313	DN 65/PN 16

Options V Intermediate Tank

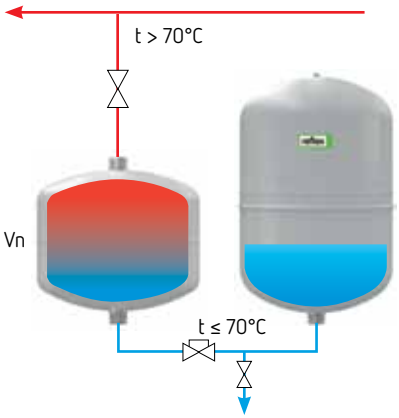
- Operation pressure >10 bar
- Nominal volume > 5000 litres
- Operation temperature > 120°C
- German TÜV factory test certification
- Individual approval carried out by the TÜV [Nofitied body] in accordance with the 2014/108/EC directives

V Intermediate Tank Applications

The V Intermediate tank protects the diaphragm / bladder of expansion vessels from impermissible temperature loads. According to DIN 4807 T3 and EN 13831, the continuous temperature on the diaphragms must not exceed 70°C. In a cooling water systems, temperatures ≤ 0°C should be avoided.

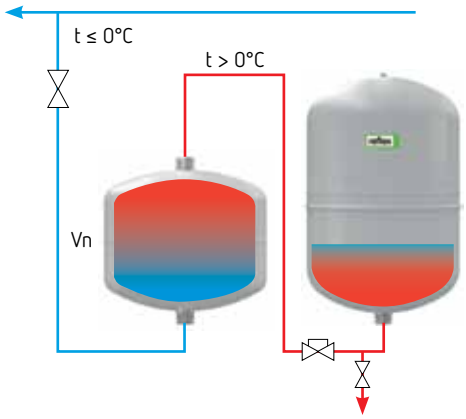
In heating & solar systems

As a rule, heating & solar systems are operated at return temperatures of ≤ 70°C. The installation of intermediate tank is not necessary. In the case of older systems and industrial plants, return temperatures > 70°C are sometimes unavoidable.



In cooling circuits

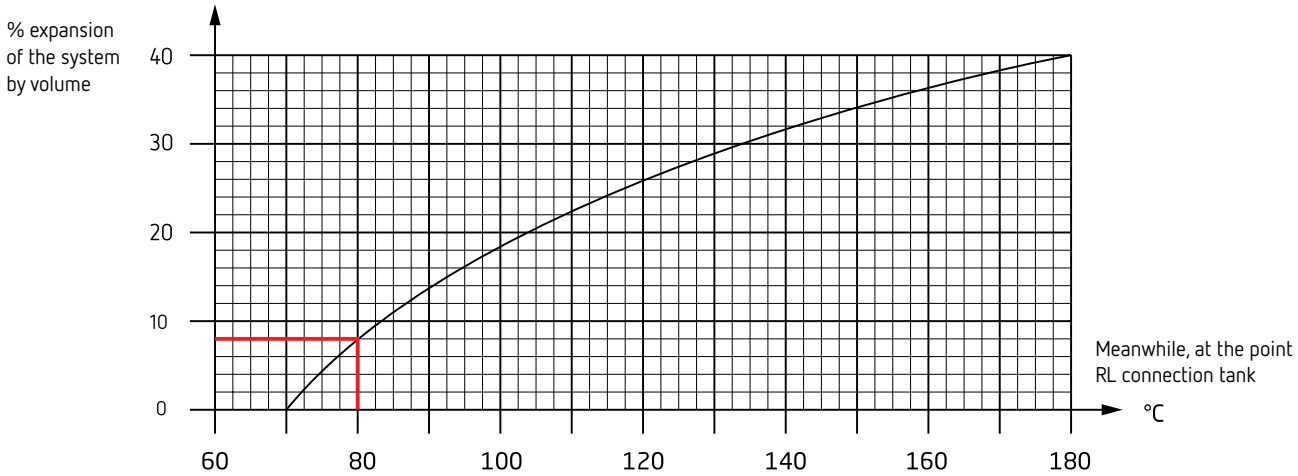
If temperature is 0°C, we recommend to an intermediate tank will be installed before the cooling vessel. To size the intermediate tank volume (Vn) , consult Reflex calculation program.



V Intermediate Tank Calculation

- If the temperature is ≤ 0 ° C, before expansion vessel Reflex V essentials to set provisional capacity:

Vn = 0.005 x Vs Vn = Nominal tank volume, Litres Vs = Total volume of the system, Litres



The total volume of the system Vs = 50 m³ = 50000 l
Max. system pressure = 10 bar
Flow Temperature = 105°C
Return Temperature = 80°C

Vcal = Vs x n

n = Expansion coefficient at an average temperature in the system (for example, 105/80°C, n = 0,038 cm. Reflex Pro software).
(If there is a possibility that the return temperature rises to a temperature in the supply line must be used the coefficient of expansion at max. temperature to 105 ° C, n = 0,047!)

Vcal = Vs x n = 50,000 * 0,038 = 1,900 litres

When the temperature in the return line 80 ° C provisional volume capacity Reflex V is equal to 8% of the volume expansion system,

Vn = 1900 * 0.08 = 152 litres

(If there is a possibility that the return temperature rises to a temperature in the supply pipe, the amount of the provisional Reflex V capacitance equals 20.5% of the volume expansion system above for graph 105°C)

Select Reflex V 200/10 bar

Quick Selection Table For Diaphragm Expansion Vessels

For detailed calculations, refer to our brochure "Pressurisation Systems - Planning, Calculation, Equipment" or visit www.reflex.de to use our Reflex Pro calculation software

Safety valve Psv bar	2.5		Vn	3.0				Vn	4.0				Vn	5.0					Vn
Pre-set pressure bar P0	1.0	1,5	litres	0.5	1.0	1,5	1,8	litres	1,5	2.0	2,5	3.0	litres	2.0	2,5	3.0	3,5	4.0	litres
Content litres Vs	30	-	8	85	50	19	-	8	55	30	5	-	8	55	37	16	-	-	8
	45	-	12	120	75	29	-	12	80	45	7	-	12	85	55	24	-	-	12
	85	-	18	200	130	60	17	18	140	85	28	-	18	140	100	55	8	-	18
	150	33	25	320	220	120	55	25	230	150	70	-	25	230	170	110	43	-	25
	240	80	35	470	340	200	110	33	330	240	130	25	33	360	270	180	95	5	33
	380	110	50	700	510	320	200	50	540	380	230	70	50	550	420	300	170	43	50
	500	170	80	1120	840	440	260	80	870	650	410	120	80	890	710	530	320	95	80
	620	210	100	1400	1050	540	330	100	1090	820	430	150	100	1110	890	670	420	120	100
	870	300	140	1960	1470	760	460	140	1530	1140	610	200	140	1560	1250	940	510	170	140
	1240	420	200	2800	2100	1090	660	200	2180	1630	870	290	200	2230	1780	1340	720	240	200
	1550	530	250	3500	2630	1360	820	250	2720	2040	1090	370	250	2790	2230	1670	900	300	250
	1860	630	300	4200	3150	1630	990	300	3270	2450	1300	440	300	3340	2670	2010	1080	360	300
	2480	850	400	5600	4200	2180	1320	400	4360	3270	1740	580	400	4460	3570	2670	1440	480	400
	3100	1060	500	6920	5250	2720	1650	500	5450	4080	2170	730	500	5570	4460	3340	1800	600	500
	3720	1270	600	8400	6300	3260	1980	600	6540	4900	2610	880	600	6680	5350	4010	2170	730	600
	4970	1690	800	11200	8400	4350	2640	800	8710	6540	3480	1170	800	8910	7130	5350	2890	970	800
	6210	2120	1000	13830	10500	5440	3300	1000	10890	8170	4350	1460	1000	11140	8910	6680	3610	1210	1000

Selection example
P_{SV} = 3 bar
H = 13 m
Q = 40 kW (plates 90/70°C)

V_{PH} = 1000 l (V buffer storage tank)

Calculate
Vs = 40 kW x 8.5 l/kW + 1000 = 1340 l

$P0 \geq \left(\frac{13}{10} + 0.2 \text{ bar}\right) = 1.5 \text{ bar}$

From the table:
With P_{SV} = 3 bar, P_0 = 1.5 bar
Vs = 1340 litres
V_n = 250 litres (for Vs max. 1360)

Selected:
1 x Reflex N 250/6 bar
1 x Lockshield cap valve

Reflex recommendations:

- Select sufficiently high safety valve actuation pressure:
  $P_{SV} \geq P_0 + 1.5$ bar
- If possible, apply a 0.2 bar margin when calculating the gas input pressure: $P_0 \geq \frac{H\,[m]}{10} + 0.2$ bar
- Due to the required supply pressure for the circulating pumps, select a pre-set pressure of at least 1 bar for roof-mounted systems also:
  $P_0 \geq 1$ bar
- In a vented system in cold conditions, set the water-side filling or initial pressure at least 0.3 bar higher than the pre-set pressure:
  $P_a \geq P_0 + 0.3$ bar

Approximate water content:

Radiators
Vs = Q [kW] x 13.5 l/kW

Panel-type radiators
Vs = Q [kW] x 8.5 l/kW

Chiller
Vs = Q [kW] x 18 l/kW

Theoretical principles

Expansion vessels (MAG) with a gas charge are functional without auxiliary energy and, for this reason, are classified as static pressurisation systems. A gas blanket in the vessel generates the pressure.

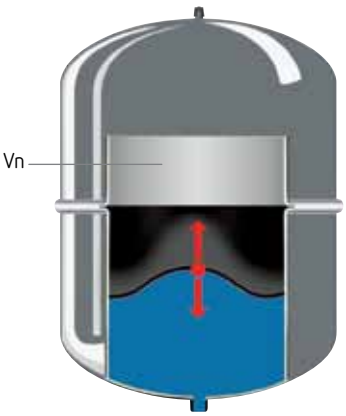
Water level and pressure in the gas chamber are interconnected (p x V = constant).

For this reason, it is not possible to utilise the entire **nominal volume Vn** for holding water.

The nominal volume is larger than the required water holding volume

$$Vn = (Ve + Vws)\frac{Pf + 1}{Pf - P0}$$

This is one reason for the preference of dynamic pressure maintaining systems in larger systems and tight pressure ratios (Pf - P0).

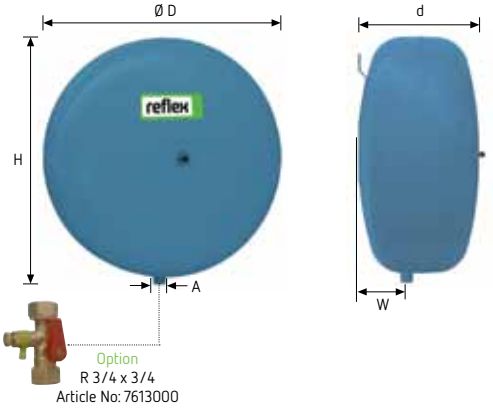


Calculating the nominal volume

$$Vn = (Ve + Vws)\frac{Pf + 1}{Pf - P0}$$

Refix C - DE

- Non-replaceable **butyl** bladder, according to DIN EN 13831 norm part 3
- Threaded stainless steel connection
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating
- Factory pre-pressurised gas chamber (Nitrogen)
- Provided with suspension bracket for easy wall mounting



CE ACS

	Type 10 bar / 70°C	Article No Blue	Material Group	PU	Weight kg	Ø D mm	H mm	d mm	W mm	A	Pre-charge pressure bar
10 bar	C-DE 8	7270900	17	96	3.8	280	300	163	52	G 1/2	4.0
	C-DE 12	7270910	17	60	5.2	354	375	168	64	G 1/2	4.0
	C-DE 18	7270920	17	42	5.6	354	375	222	76	G 3/4	4.0
	C-DE 25	7270930	17	42	8.2	409	430	239	93	G 3/4	4.0
	C-DE 35	7270940	17	24	13.0	480	500	240	97	G 3/4	4.0
	C-DE 50	7270950	17	20	15.4	480	500	318	125	G 3/4	4.0
	C-DE 80	7270960	17	8	22.4	634	654	325	135	G 3/4	4.0

Refix DC

- For potable water, fire fighting and hydro-pneumatic well applications
- Non-replaceable diaphragm, according to DIN EN 13831 norm part 3
- All vessel parts in contact with water are coated against corrosion
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating
- Factory pre-pressurised gas chamber (Nitrogen)

CE WRAS ACS

	Type 10 bar / 70°C	Article No Blue	Material Group	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
10 bar	DC 25	7200400	54	4.7	280	520	-	G 1	2.0
	DC 50	7309600	54	12.5	409	588	113	R 1	4.0
	DC 80	7309700	54	17.0	480	680	104	R 1	4.0
	DC 100	7309800	54	20.5	480	785	104	R 1	4.0
	DC 140	7309900	54	29.0	480	997	104	R 1	4.0
	DC 200	7363500	54	40.0	634	883	91	R 1	4.0
	DC 300	7363600	54	52.0	634	1184	93	R 1	4.0
	DC 400	7363700	54	78.0	740	1173	81	R 1	4.0
	DC 500	7363800	54	80.0	740	1392	82	R 1	4.0
	DC 600	7363900	54	103.0	740	1629	73	R 1	4.0

Refix DE

- For potable water, water heating and hydro-pneumatic well applications
- Bladder according to DIN EN 13831 norm part 3
- From 60 litres volume with replaceable bladder
- All vessel parts in contact with water are coated against corrosion
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Fitted with manometer from Ø 1000 mm
- Threaded connections up to 1000 litres
- Flanged connections above 1000 litres
- 3000 to 10000 litres with upper flange
- Durable epoxy coating
- Factory pre-pressurised gas chamber (Nitrogen)

Option
Wall-hung bracket
Article No: 7611000

2-25 litres

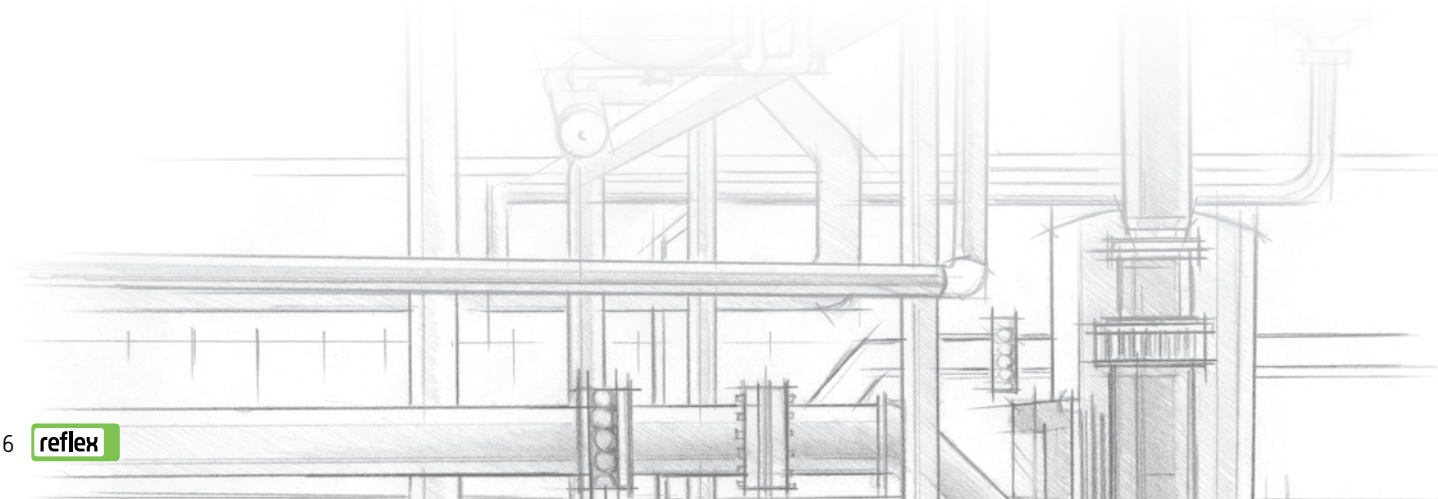
33 litres

50-500 litres

CE WRAS ACS

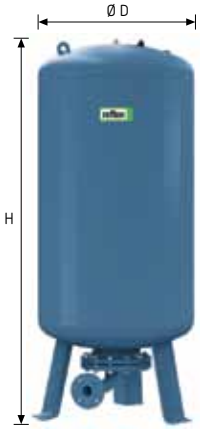
	Type 10 bar / 70°C	Article No Blue	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
10 bar	DE 1	7100300	40	-	1.0	122	173	-	G 1/2	4
	DE 2	7200300	40	288	1.0	132	260	-	G 3/4	4
	DE 8	7301000	40	96	1.7	206	335	-	G 3/4	4
	DE 12	7302000	40	60	2.4	280	307	-	G 3/4	4
	DE 18	7303000	40	56	2.8	280	410	-	G 3/4	4
	DE 25	7304000	40	42	3.7	280	520	-	G 3/4	4
	DE 33	7303900	40	24	5.7	354	454	-	G 3/4	4
	DE 33 [1]	7305500	40	24	6.5	354	520	66	G 3/4	4
	DE 50	7306005	42	20	9.5	409	604	102	G 1	4
	DE 60	7306400	42	18	11.2	409	734	161	G 1	4
	DE 80	7306500	42	10	14.0	480	745	153	G 1	4
	DE 100	7306600	42	10	16.0	480	850	153	G 1	4
	DE 200	7306700	42	4	36.5	634	967	150	G 1 1/4	4
	DE 300	7306800	42	-	41.5	634	1267	150	G 1 1/4	4
	DE 400	7306850	42	-	73.0	740	1245	139	G 1 1/4	4
	DE 500	7306900	42	-	103.0	740	1475	133	G 1 1/4	4
	DE 600	7306950	42	-	128.0	740	1859	263	G 1 1/2	4
	DE 800	7306960	42	-	176.0	740	2325	263	G 1 1/2	4
	DE 1000 Ø 740	7306970	42	-	214.0	740	2604	263	G 1 1/2	4
	DE 1000 Ø 1000	7311405	44	-	427.0	1000	2001	291	DN 65/PN 16	4
	DE 1500	7311605	44	-	542.0	1200	1991	286	DN 65/PN 16	4
	DE 2000	7311705	44	-	717.0	1200	2451	291	DN 65/PN 16	4
	DE 3000	7311805	44	-	962.0	1500	2521	320	DN 65/PN 16	4
	DE 4000	7354000	44	-	1085.0	1500	3070	320	DN 65/PN 16	4
	DE 5000	7354200	44	-	1050.0	1500	3635	320	DN 65/PN 16	4
	DE 8000		44	-	1750.0	1500	5404	236	DN 100/PN 16	4
	DE 10000		44	-	1750.0	1500	6560	236	DN 100/PN 16	4

[1] With legs

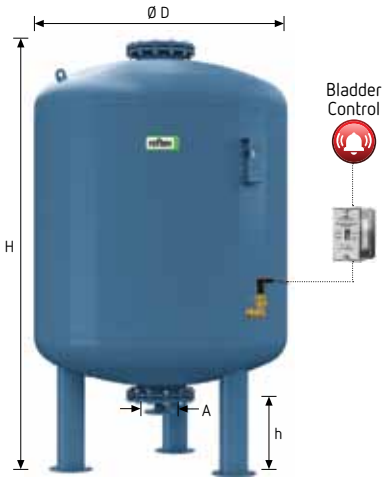


Refix DE

600-1000 litres
Ø 740



80 - 1000 litres
Ø 740/25 bar



3000-10000 litres

MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Reflex G
- Consists of an electrode and relay (factory-mounted)
- Operates 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel

Article No : 7857700 **Material Group** : 86

Relay
Wall mounted (on site)

Electrode
Factory mounted

	Type 16 bar / 70°C	Article No Blue	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
16 bar	DE 8	7301006	40	96	2.7	206	335	-	G 3/4	4
	DE 12	7302105	40	60	3.5	280	309	-	G 3/4	4
	DE 25	7304015	40	42	5.6	280	520	-	G 3/4	4
	DE 80	7348600	42	4	23.0	480	745	153	G 1	4
	DE 100	7348610	42	4	27.0	480	850	153	G 1	4
	DE 200	7348620	42	-	57.0	634	967	150	G 1 1/4	4
	DE 300	7348630	42	-	66.0	634	1267	150	G 1 1/4	4
	DE 400	7348640	42	-	116.0	740	1394	265	G 1 1/4	4
	DE 500	7348650	42	-	127.0	740	1614	265	G 1 1/4	4
	DE 600	7348660	42	-	158.0	740	1859	265	G 1 1/4	4
	DE 800	7348670	42	-	202.0	740	2324	265	G 1 1/4	4
	DE 1000 Ø 740	7348680	42	-	244.0	740	2604	265	G 1 1/4	4
	DE 1000 Ø 1000	7312805	44	-	530.0	1000	2001	286	DN 65/PN 16	4
	DE 1500	7312905	44	-	685.0	1200	1991	291	DN 65/PN 16	4
	DE 2000	7313005	44	-	895.0	1200	2451	291	DN 65/PN 16	4
	DE 3000	7313105	44	-	1240.0	1500	2521	320	DN 65/PN 16	4
	DE 4000	7354100	44	-	1100.0	1500	3110	320	DN 65/PN 16	4
	DE 5000	7354300	44	-	1120.0	1500	3645	320	DN 65/PN 16	4
	DE 8000		44	-	1750.0	1500	5404	236	DN 100/PN 16	4
	DE 10000		44	-	1750.0	1500	6560	236	DN 100/PN 16	4

	Type 25 bar / 70°C	Article No Blue	Material Group	PU	Weight kg	Ø D mm	H mm	h mm	A	Pre-charge pressure bar
25 bar	DE 8	7290100	40	60	3.5	206	335	-	G 3/4	4
	DE 80	7317600	44	-	70.0	450	942	159	DN 50/PN 40	4
	DE 120	7313700	44	-	100.0	450	1253	159	DN 50/PN 40	4
	DE 180	7313500	44	-	116.0	450	1528	159	DN 50/PN 40	4
	DE 300	7313800	44	-	150.0	750	1318	160	DN 50/PN 40	4
	DE 400	7313300	44	-	245.0	750	1423	160	DN 50/PN 40	4
	DE 600	7321500	44	-	290.0	750	1868	159	DN 50/PN 40	4
	DE 800	7321200	44	-	355.0	750	2268	159	DN 50/PN 40	4
	DE 1000 Ø 750	7321000	44	-	245.0	750	2768	159	DN 50/PN 40	4
	DE 1000 Ø 1000	7322200	44	-	800.0	1000	2051	242	DN 65/PN 40	4
	DE 1500	7322100	44	-	850.0	1200	2071	291	DN 65/PN 40	4
	DE 2000	7313400	44	-	960.0	1200	2531	240	DN 65/PN 40	4
	DE 3000	7345700	44	-	1550.0	1500	2609	269	DN 65/PN 40	4

Options

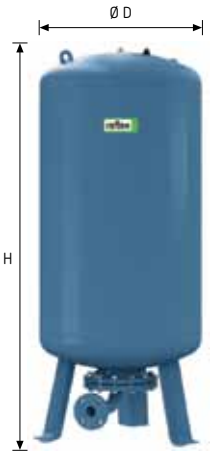
- Operation pressure of 40 bar
- Flanged connection DN 150 etc.
- Inner lining according to DIN/DVGW norms
- Stainless steel connection

AG Connection

Article	Article No	Suitable For Model
R 1	9119204	DE 50 - 100 / DC 50 - 600
R 1 1/4	9119205	DE 200 - DE 1000 / Ø 740 - 16 bar
R 1 1/2	9119206	DE 600 - DE 1000 / Ø 740 - 10 bar

Refix DE Bladder Type Pressure Vessels For Anti-Water Hammer Applications

- Anti-water hammer applications for pumping systems
- Suitable for potable, raw and waste water
- Vertical tank construction with feet
- Nominal volume range from 300 ltr to 10.000 ltr
- Max. operating pressure 10 bar
- Test pressure = 1.43 time the max. operating pressure
- Elbow-type flanged water connection
- For 3000 ltr and above , extra inspection flange on the top of the tank
- Heavy gauge steel , depending on the model : S235 JR+AR ; P265GH ; DD 11
- High quality butyl interchangeable bladder according to DIN EN 13831
- Max. temperature for bladder in continuous operation -10°C to 70°C
- Corrosion protection outer painting in durable epoxy coating with min. thickness of 30 µm in blue colour (RAL 5007)
- All vessel parts in contact with water are coated against corrosion
- Pressure gauge diam. 63 mm through R 1/4" threaded connection
- Factory pre-pressurized gas chamber (Nitrogen)



300 - 1000 litres
Ø 740

1000 - 10000 litres

CE

	Type 10 bar / 70°C	Volume Nominal (litres)	Weight kg	Ø D mm	H mm	A	Pre-charge pressure bar
10 bar	DE 300	300	41,5	750	1262	DN 80	4
	DE 400	400	73	750	1367	DN 80	4
	DE 600	600	103	750	1842	DN 80	4
	DE 800	800	176	750	2242	DN 80	4
	DE 1000 Ø 740	1000	214	750	2742	DN 80	4
	DE 1000 Ø 1000	1000	427	1000	2001	DN 80 / DN 200	4
	DE 1500	1500	542	1200	1991	DN 80 / DN 200	4
	DE 2000	2000	717	1200	2451	DN 80 / DN 200	4
	DE 3000	3000	962	1500	2521	DN 80 / DN 200	4
	DE 4000	4000	1085	1500	3070	DN 80 / DN 200	4
	DE 5000	5000	1050	1500	3635	DN 80 / DN 200	4
	DE 8000	8.000	1750	1500	5404	DN 80 / DN 200	4
	DE 10000	10.000	1750	1500	6560	DN 80 / DN 200	4

For product article number contact us

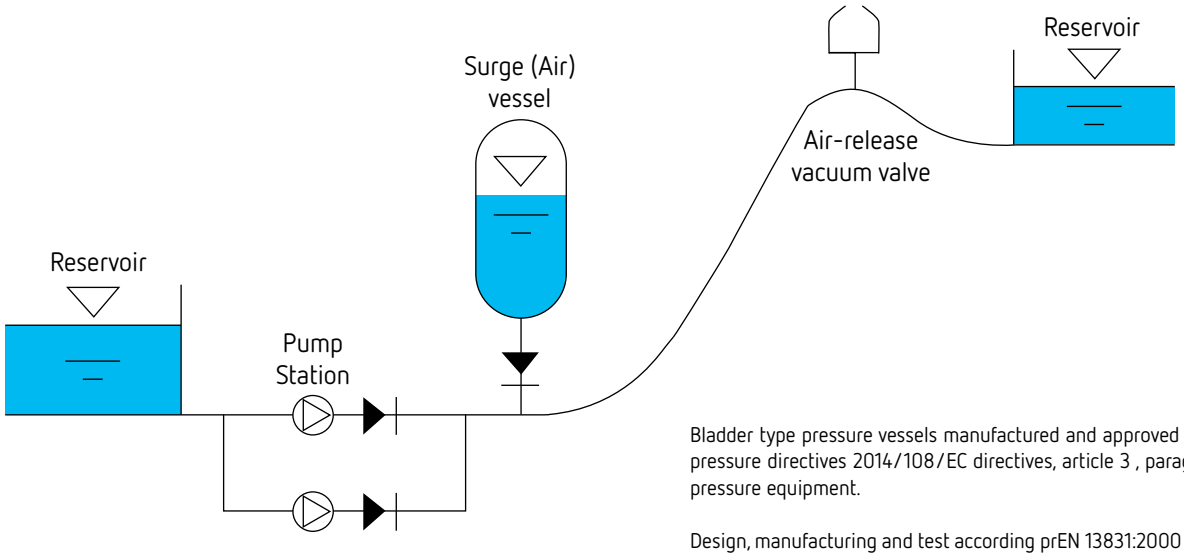
Options

- Operating pressure of 16 bar, 25 bar, or above
- Nominal volume above 10.000 ltr
- Horizontal tank design
- Bladder rupture detector MBM II (230 V / 50 Hz)
- Stainless steel water connection
- Non-standard flange connection
- Outer coating for aggressive environment , inner coating according to ISO 12944-2 norm , Class C2 , C3 , C4 or C5

Documentation (upon request)

- Dimensional drawing
- Conformity certificate according to 2014/108/EC directives
- TÜV Quality certification for welding operators
- Hydraulic test certificate
- Material certification

Refix DE Bladder Type Pressure Vessels For Anti-Water Hammer Applications



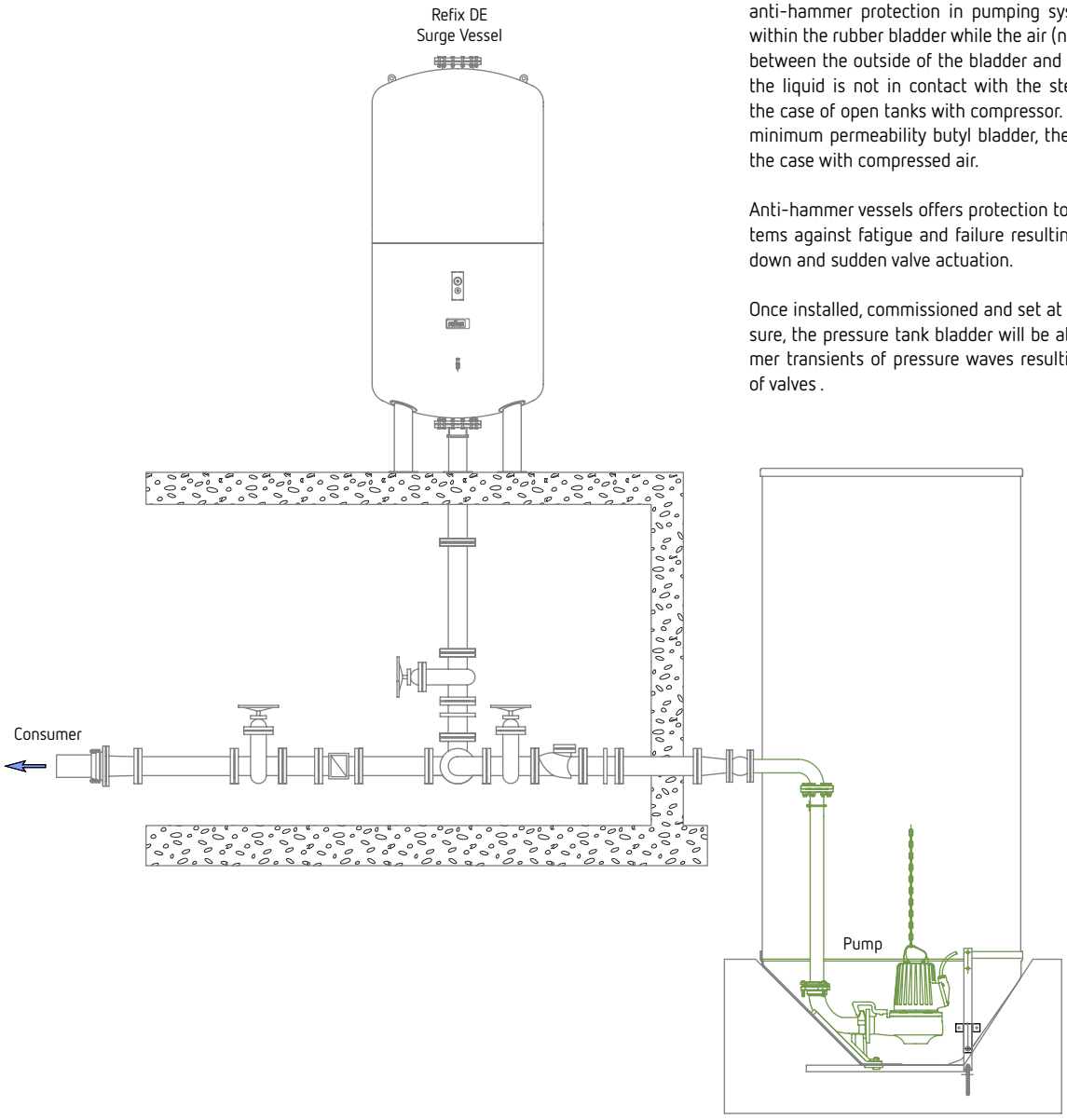
Bladder type pressure vessels manufactured and approved according to pressure directives 2014/108/EC directives, article 3 , paragraph 2.2 for pressure equipment.

Design, manufacturing and test according prEN 13831:2000 norm. Reflex Winkelmann GmbH is an ISO:9001 quality registered company by TÜV Nord Systems GmbH + Co. KG

Reflex pressure vessels , with interchangeable bladder, destined for the anti-hammer protection in pumping systems. The liquid is contained within the rubber bladder while the air (nitrogen) is trapped in the space between the outside of the bladder and the wall of the vessel. Therefor the liquid is not in contact with the steel walls of the vessel as it is the case of open tanks with compressor. Since the water is contained in minimum permeability butyl bladder, there is no air dissolution as it is the case with compressed air.

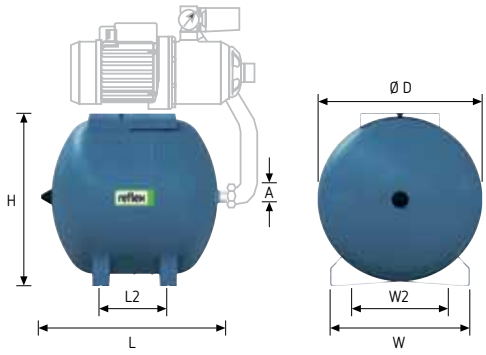
Anti-hammer vessels offers protection to pipe network of pumping systems against fatigue and failure resulting from pump start-up / shut-down and sudden valve actuation.

Once installed, commissioned and set at the adequate pre-charge pressure, the pressure tank bladder will be able to dampen the water hammer transients of pressure waves resulting from opening or shutdown of valves .



Refix HW

- For potable water, fire fighting and hydro-pneumatic well applications
- Bladder, according to DIN EN 13831 norm part 3, max. operating temperature 70°C
- All vessel parts in contact with water are coated against corrosion
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Durable epoxy coating
- Factory pre-pressurised gas chamber (Nitrogen)
- From 50 litres volume with replaceable bladder



CE WRAS ACS

	Type 10 bar / 70°C	Article No Blue	Material Group	PU	Weight kg	Ø D mm	H mm	L mm	L2 mm	W2 mm	W mm	A	Pre-charge Pressure bar
10 bar	HW 25	7200310	49	36	5.3	280	293.4	520	228	214	270	G 3/4	2
	HW 50	7200320	49	20	15.0	409	433	503	175	285	350	G 3/4	2
	HW 60	7200330	49	16	16.0	409	433	573	175	285	350	G 1	2
	HW 80	7200340	49	16	17.0	480	495	595	230	285	355	G 1	2
	HW 100	7200350	49	16	15.0	480	495	705	340	285	355	G 1	2

Refix DE 1

- To be used along devices where sudden pressure build-up is caused by quick shut-off such as washing machines, dish washers etc.
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Volume 1 litres
- Durable epoxy coating
- Factory pre-pressurised gas chamber 4 bar (Nitrogen)
- 10 bar / 70°C

Article No : 7100300 **Material Group** : 40

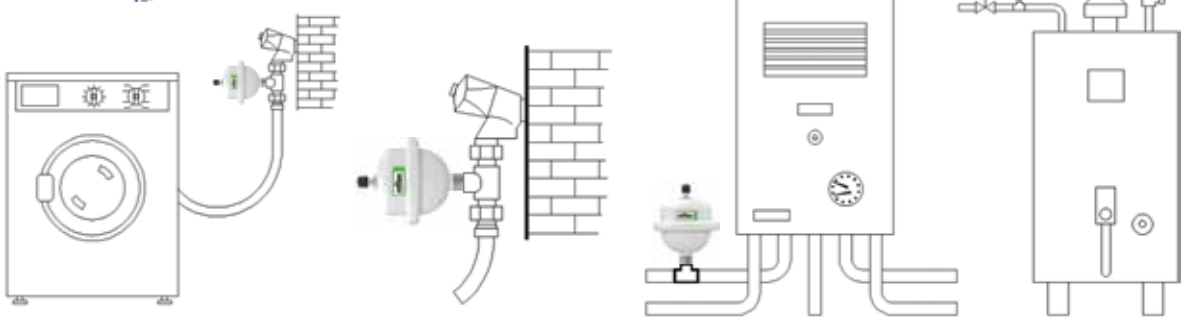
CE

Refix Water Shock Arrestor

- To be used along devices where sudden pressure build-up is caused by quick shut-off such as washing machines, dish washers etc.
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Volume 165 cm³
- Durable epoxy coating
- Factory pre-pressurised gas chamber 4 bar (Nitrogen)
- 10 bar / 70°C

Article No : 7351000 **Material Group** : 74

CE WRAS ACS



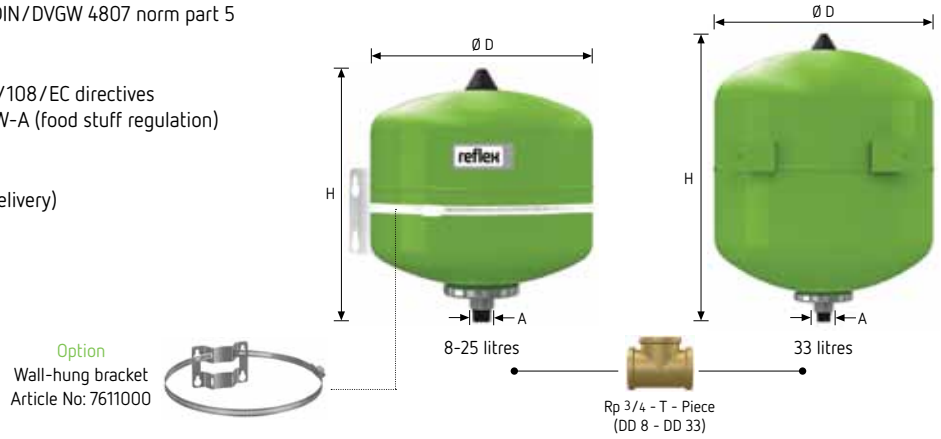
Refix

Refix DD/DT Hygienic Pressure Vessels

- The Refix DD/DT vessels continue to deliver unparalleled performance and persistence, meeting all the tough requirements of the German DIN 4807 part 5. The shell of the tank is made of heavy gauge steel and has epoxy coating from inside.
- The dual water connection for internal circulation delivered in various sizes ranging from 1 1/4 up to DN 100. The butyl rubber bladder offers the lowest permeability compared to any material used today.

Refix DD

- For potable water applications according to German DIN/DVGW 4807 norm part 5
- Integrated internal circulation
- Butyl bladder according to German KTW-C norm
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Inner anti-corrosion coating according to German KTW-A (food stuff regulation)
- Factory pre-pressurised gas chamber (Nitrogen)
- Can be installed with Flowjet - flow through valve
- Connectable to T-piece Rp 3/4 (included in Refix DD delivery)



	Type 10 bar / 70°C	Article No Green	Article No White	Material Group	PU	Weight kg	D mm	H mm	A	Pre-charge Pressure bar
10 bar	DD 2 [1]	7381500	-	48	288	1.0	132	269	G 3/4	4
	DD 8	7308000	7307700	48	96	1.7	206	345	G 3/4	4
	DD 12	7308200	7307800	48	60	2.0	280	318	G 3/4	4
	DD 18	7308300	7307900	48	56	2.5	280	420	G 3/4	4
	DD 25	7308400	7380400	48	42	3.3	280	530	G 3/4	4
	DD 33	7380700	7380800	48	24	5.8	354	468	G 3/4	4

10 bar	Type 10 bar / 70°C	Article No Blue	Article No White	Material Group	PU	Weight kg	D mm	H mm	A	Pre-charge Pressure bar
	DD 8	7290200	7290300	48	60	3.2	206	345	G 3/4	4

[1] T - Piece is not included to the delivery

Flowjet - Flow Through, Shut-off and Discharge Valve

- For easy assembly and maintenance of Refix DD pressure tanks according to DIN/DVGW 4807 norm part 5
- Max. operating pressure 16 bar
- Max. operating temperature 70°C

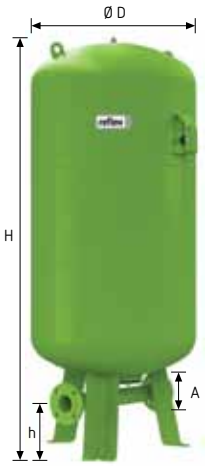
Article No : 9116799 **Material Group** : 85


Flowjet

Refix DT

- For potable water applications according to German DIN/DVGW 4807 norm part 5
- Integrated internal circulation
- In case of Rp 1/4 connection (60 - 500 litres) factory-equipped with Flowjet: flow-through, shut-off and discharge valve
- Replaceable butyl bladder according to German KTW-C norm
- Inner anti-corrosion coating according to German KTW-A (food stuff regulation)
- Meets or exceeds EC norms for pressure vessels 2014/108/EC directives
- Factory pre-pressurised gas chamber (Nitrogen)

60-500 litres
Flowjet



600-1000 litres (Ø 740)
Duo Connection

CE DVGW ACS

	Type 10 bar / 70°C	Connection	Article No Green	Material Group	Weight kg	Ø D mm	H mm	h mm	Pre-charge Pressure bar
10 bar	DT 60	Flow jet Rp 1 1/4	7309000	47	15.0	409	766	80	4
	DT 80	Flowjet Rp 1 1/4	7309100	47	16.5	480	765	65	4
		DN 50/PN 16	7365000	47	23.0	480	765	100	4
		DN 50/PN 16	7335705	47	24.0	480	765	110	4
		DN 50/PN 16	7335805	47	26.0	480	765	115	4
	DT 100	Flowjet Rp 1 1/4	7309200	47	18.6	480	870	65	4
		DN 50/PN 16	7365400	47	26.0	480	870	100	4
		DN 65/PN 16	7365405	47	27.0	480	870	110	4
		DN 80/PN 16	7365406	47	28.0	480	870	115	4
	DT 200	Flowjet Rp 1 1/4	7309300	47	37.0	634	975	80	4
		DN 50/PN 16	7365100	47	53.0	634	975	105	4
		DN 65/PN 16	7365105	47	54.0	634	975	115	4
		DN 80/PN 16	7365106	47	57.0	634	975	120	4
	DT 300	Flowjet Rp 1 1/4	7309400	47	43.5	634	1275	80	4
		DN 50/PN 16	7365200	47	59.0	634	1275	105	4
		DN 65/PN 16	7336305	47	60.0	634	1275	115	4
		DN 80/PN 16	7336405	47	63.0	634	1275	120	4
	DT 400	Flowjet Rp 1 1/4	7319305	47	73.0	740	1245	70	4
		DN 50/PN 16	7365500	47	79.0	740	1245	95	4
		DN 65/PN 16	7336505	47	80.0	740	1245	105	4
		DN 80/PN 16	7336605	47	83.0	740	1245	110	4
	DT 500	Flowjet Rp 1 1/4	7309500	47	69.0	740	1475	70	4
		DN 50/PN 16	7365300	47	85.0	740	1475	90	4
		DN 65/PN 16	7365307	47	86.0	740	1475	100	4
		DN 80/PN 16	7365305	47	89.0	740	1475	110	4
	DT600	DN 50/PN 16	7365600	47	164.0	740	1860	235	4
		DN 65/PN 16	7336705	47	165.0	740	1860	235	4
		DN 80/PN 16	7336806	47	177.4	740	1860	235	4
	DT 800	DN 50/PN 16	7365700	47	204.0	740	2325	235	4
		DN 65/PN 16	7336905	47	205.0	740	2325	235	4
		DN 80/PN 16	7337006	47	208.0	740	2325	235	4
	DT 1000 Ø 740	DN 50/PN 16	7365800	47	244.0	740	2805	235	4
		DN 65/PN 16	7337105	47	245.0	740	2805	235	4
		DN 80/PN 16	7337205	47	248.0	740	2805	235	4
	DT 1000 Ø 1000	DN 50/PN 16	7320105	46	386.2	1000	2000	160	4
		DN 65/PN 16	7337305	46	386.2	1000	2000	150	4
		DN 100/PN 16	7337405	46	386.2	1000	2000	140	4
	DT 1500	DN 65/PN 16	7320305	46	502.4	1200	2000	160	4
		DN 80/PN 16	7337505	46	502.4	1200	2000	150	4
		DN 100/PN 16	7337605	46	502.4	1200	2000	140	4
	DT 2000	DN 65/PN 16	7320505	46	686.5	1200	2450	160	4
		DN 80/PN 16	7337705	46	686.5	1200	2450	150	4
		DN 100/PN 16	7337805	46	686.5	1200	2450	140	4
	DT 3000	DN 65/PN 16	7320705	46	1054.0	1500	2520	190	4
		DN 80/PN 16	7337905	46	1057.0	1500	2520	180	4
		DN 100/PN 16	7338005	46	1057.0	1500	2520	170	4

Refix DT

1000-2000 litres (Ø 1000)
Duo Connection

3000 litres
Duo Connection

MBM II Bladder Rupture Detector

- For the signalling of bladder rupture in Reflex G
- Consists of an electrode and relay (factory-mounted)
- Operates 230 V / 50 Hz supply
- Three terminal dry contact
- Recommended: 1 device for each vessel

Article No : 7857700 **Material Group** : 86

Relay
Wall mounted (on site)

Electrode
Factory mounted

16 bar

Type 16 bar / 70°C	Connection	Article No Green	Material Group	Weight kg	Ø D mm	H mm	h mm	Pre-charge Pressure bar
DT 80	Flow jet Rp 1 1/4	7316005	47	27.0	480	765	65	4
	DN 50/PN 16	7370000	47	32.0	480	765	100	4
	DN 65/PN 16	7310306	47	33.0	480	765	110	4
	DN 80/PN 16	7310307	47	35.0	480	765	115	4
DT 100	Flow jet Rp 1 1/4	7365408	47	29.0	480	870	65	4
	DN 50/PN 16	7370100	47	34.0	480	870	100	4
	DN 65/PN 16	7370101	47	35.0	480	870	110	4
	DN 80/PN 16	7370102	47	37.0	480	870	115	4
DT 200	Flow jet Rp 1 1/4	7365108	47	55.0	634	975	80	4
	DN 50/PN 16	7370200	47	61.0	634	975	105	4
	DN 65/PN 16	7370205	47	62.0	634	975	115	4
	DN 80/PN 16	7370206	47	65.0	634	975	120	4
DT 300	Flow jet Rp 1 1/4	7319205	47	64.0	634	1275	80	4
	DN 50/PN 16	7370300	47	70.0	634	1275	105	4
	DN 65/PN 16	7314205	47	71.0	634	1275	115	4
	DN 80/PN 16	7314206	47	74.0	634	1275	120	4
DT 400	DN 50/PN 16	7370400	47	113.0	740	1395	235	4
	DN 65/PN 16	7339006	47	119.0	740	1395	235	4
	DN 80/PN 16	7339005	47	122.0	740	1395	235	4
DT 500	DN 50/PN 16	7370500	47	130.0	740	1615	235	4
	DN 65/PN 16	7370507	47	131.0	740	1615	235	4
	DN 80/PN 16	7370505	47	134.0	740	1615	235	4
DT600	DN 50/PN 16	7370600	47	174.0	740	1860	235	4
	DN 65/PN 16	7339105	47	175.0	740	1860	235	4
	DN 80/PN 16	7339205	47	178.0	740	1860	235	4
DT 800	DN 50/PN 16	7370700	47	224.0	740	2325	235	4
	DN 65/PN 16	7339305	47	225.0	740	2325	235	4
	DN 80/PN 16	7339406	47	228.0	740	2325	235	4
DT 1000 Ø 740	DN 50/PN 16	7370800	47	259.0	740	2805	235	4
	DN 65/PN 16	7339505	47	260.0	740	2805	235	4
	DN 80/PN 16	7339605	47	263.0	740	2805	235	4
DT 1000 Ø 1000	DN 65/PN 16	7320205	46	488.0	1000	2000	160	4
	DN 80/PN 16	7339705	46	488.0	1000	2000	150	4
	DN 100/PN 16	7339805	46	488.0	1000	2000	140	4
DT 1500	DN 65/PN 16	7320405	46	630.0	1200	2000	160	4
	DN 80/PN 16	7339905	46	630.0	1200	2000	150	4
	DN 100/PN 16	7340005	46	630.0	1200	2000	140	4
DT 2000	DN 65/PN 16	7320605	46	850.0	1200	2450	160	4
	DN 80/PN 16	7340105	46	850.0	1200	2450	150	4
	DN 100/PN 16	7340205	46	850.0	1200	2450	140	4
DT 3000	DN 65/PN 16	7320805	46	1240.0	1500	2520	190	4
	DN 80/PN 16	7340305	46	1240.0	1500	2520	180	4
	DN 100/PN 16	7340405	46	1240.0	1500	2520	170	4

Options
- Operation pressure >16 bar
- MBM connection with tanks over 1000 litres

Quick Selection Table For Hot Water Heating Applications

Selection of the nominal vessel volume (Vn)

10°C Cold water inlet temperature

60°C Storage temperature

- Preset press. gas P_0 = 3.0 bar
- Set press. of the pressure reducer Pa ≥ 3.2 bar

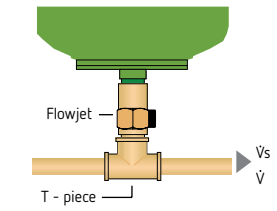
Psv [bar]	6	7	8	10
Vst [litres]	Nominal volume Refix [litres]			
90	8	8	8	8
100	8	8	8	8
120	8	8	8	8
130	8	8	8	8
150	8	8	8	8
180	12	8	8	8
200	12	12	8	8
250	12	12	12	8
300	18	18	12	12
400	25	18	18	18
500	25	25	18	18
600	33	25	25	18
700	33	33	25	25
800	60	33	33	25
900	60	60	33	25
1000	60	60	33	33
1500	80	80	60	60
2000	100	100	80	80
3000	100	100	100	100

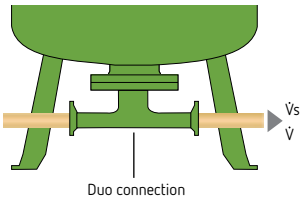
- Pre-charge press. gas P_0 = 4.0 bar = factory setting
- Set press. of the pressure reducer Pa ≥ 4.2 bar

Psv [bar]	6	7	8	10
Vst [litres]	Nominal volume Refix [litres]			
90	8	8	8	8
100	12	8	8	8
120	12	8	8	8
130	12	8	8	8
150	18	12	8	8
180	18	12	8	8
200	18	12	12	8
250	25	18	12	12
300	25	18	18	12
400	33	33	18	18
500	60	33	25	18
600	60	60	25	25
700	60	60	33	25
800	80	60	60	25
900	80	60	60	33
1000	100	60	60	60
1500	200	100	80	60
2000	200	200	100	80
3000	300	200	200	100

Selection according to peak volume flow V̇s

When the nominal volume of the Refix unit has been selected, it must be checked in the case of water-carrying vessels whether the peak volume flow V s resulting from the piping calculation according to DIN 1988 can be implemented on the Refix. If this is the case, the 8-33 litre vessel of the Refix DD unit may have to be replaced with a 60 litre Refix DT 60 vessel to enable a higher flow rate. Alternatively, a Refix DD unit with an appropriately dimensioned T-piece may be used.





Available connections		Recomm. max. peak flow V̇ s*	Actual Pressure loss with volume flow V̇
Refix DD With or without Flowjet T - piece duct	8-33 litres Rp 3/4 = Standard Rp 1 (on site)	≤ 2.5 m³/h ≤ 4.2 m³/h	$\Delta p = 0.03 \text{ bar} \cdot \left(\frac{\dot{V}\,[m^3/h]}{2.5\ m^3/h}\right)^2$ negligible
Refix DT With Flowjet Rp 1 1/4	60-500 litres	≤ 7.2 m³/h	$\Delta p = 0.04 \text{ bar} \cdot \left(\frac{\dot{V}\,[m^3/h]}{7.2\ m^3/h}\right)^2$
Refix DT Duo connection DN 50 Duo connection DN 65 Duo connection DN 80 Duo connection DN 100	80-3000 litres	≤ 15 m³/h ≤ 27 m³/h ≤ 36 m³/h ≤ 56 m³/h	$\Delta p = 0.14 \text{ bar} \cdot \left(\frac{\dot{V}\,[m^3/h]}{15\ m^3/h}\right)^2$ $\Delta p = 0.11 \text{ bar} \cdot \left(\frac{\dot{V}\,[m^3/h]}{27\ m^3/h}\right)^2$ negligible
Refix DE, DC, CD-E (non water-carrying)		Unlimited	Δp = 0

* Calculated for a speed of 2 m/s

For detailed calculations, refer to our brochure "Pressurisation Systems - Planning, Calculation, Equipment" or visit www.reflex.de to use our Reflex Pro calculation software

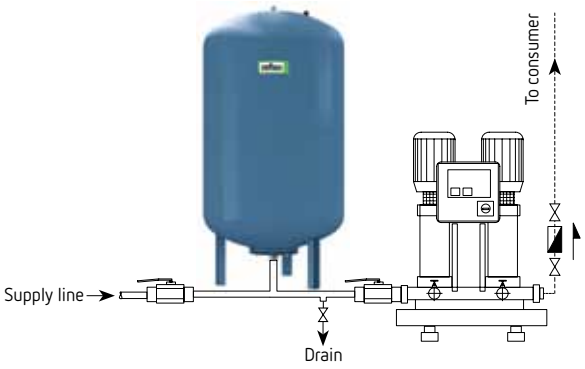
Refix Applications

Vessel on a booster set

Pressure vessels are installed on a pressure booster system in order to reduce pump starts and to eliminate pump starts at small draw-offs. This reduces pump wear and extends pump life time.

Suction side

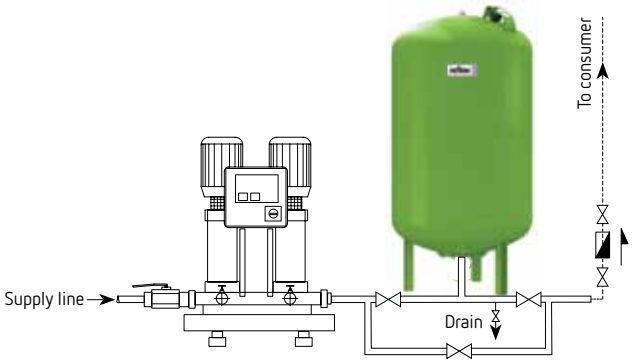
If supply pressure from the water mains is too low a pressure vessel can advantageously be installed on the suction side of the booster system. This will avoid cavitation in the pump, and also will eliminate to risk of creating vacuum in the water mains by pump starts. This will reduce the pump wear.



Diaphragm expansion tank mounted on suction side of pump	
Pressure of piping	**Precharge pressure of tank**
2 bar	1.0 bar
3 bar	1.5 bar
4 bar	2.0 bar
5 bar	2.5 bar
6 bar	3.0 bar
7 bar	3.5 bar
8 bar	4.0 bar
9 bar	4.5 bar
10 bar	5.0 bar
11 bar	5.5 bar
12 bar	6.0 bar
13 bar	6.5 bar

Discharge side

Pressure vessel with flow-through function according to DIN 4807, part 5. Inside epoxy coating in combination with butyl rubber bladder ensures to fulfil the most strict German food stuff regulations such as KTW-C (bladder) and KTW-A (inner lining). With the vessel mounted on the discharge side of the booster system, the numbers of pump starts are reduced and also pump starts at small draw-offs are totally eliminated. Maintenance of the vessel can be done without shutting off the water supply with the shown pipework.



Diaphragm expansion tank mounted on discharge side of pump	
Cut-in pressure of pump	**Precharge pressure of tank**
1 bar	0.8 bar
2 bar	1.8 bar
3 bar	2.8 bar
4 bar	3.7 bar
5 bar	4.7 bar
6 bar	5.7 bar
7 bar	6.6 bar
8 bar	7.5 bar
9 bar	8.5 bar
10 bar	9.5 bar
11 bar	10.5 bar
12 bar	11.5 bar
13 bar	12.5 bar

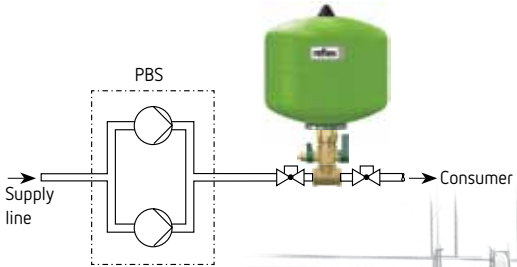
Configuration: Refix on follw-up pressure side of PBS

- To restrict the switch frequency of pressure-controlled systems

Max. delivery head of PBS	H_{max}	=.....mWs
Max. supply pressure	P_{maxs}	=.....bar
Switch-on pressure	P_{in}	=.....bar
Cut-out pressure	P_{out}	=.....bar
Max. delivery rate	$\dot{V}_{maxP}$	=.....l/h
Switch frequency	s	=.....1/h
Number of pumps	n	=.....
Electrical power of must powerful pump	P_{el}	=.....kW

s - switch frequency	1/h	20	15	10
Pump output	kW	≤ 4.0	≤ 7.5	≤ 7.5

Nominal volume $V_n = 0{,}33 \times V_{maxP} \dfrac{(P_{out} + 1)}{(P_{out} - P_{in}) \times s \times n}$

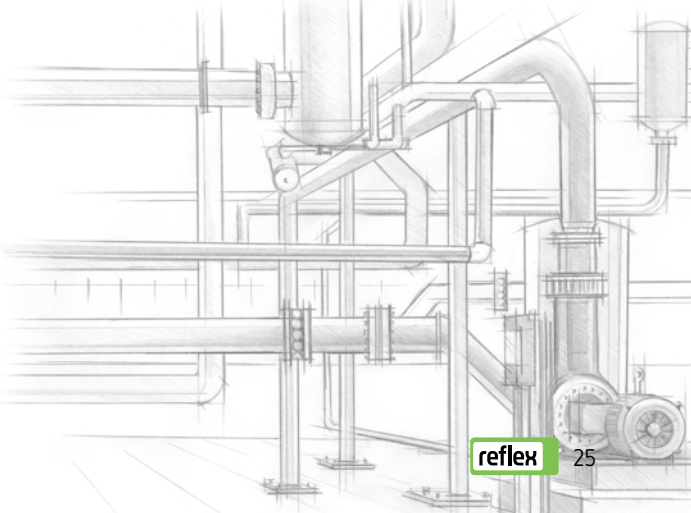


- To store the minimum supply volume Ve between activation and deactivation of the PBS

Switch-on pressure	P_{in}	=.....bar
Cut-out pressure	P_{out}	=.....bar
Input pressurure Refix	P_0	=.....bar → Reflex recommendation: $P_0 = P_{in} - 0.5$ bar
Storage capacity	Ve	=.....l

Nominal volume $V_n = V_e \dfrac{(P_{in} + 1)\ (P_{out} + 1)}{(P_0 + 1)\ (P_{out} + P_{in})}$

Check of max. excess operating pressure $P_{max} \leq 1.1\ P_{max} \dfrac{H_{max}\ [mWs]}{10}$



Reflex & Refix Applications

Applications

- In a solar system application the expansion vessel installed to the flowpipe line therefore, the pump pressure needs to be considered while setting the precharge gas P0.
- For the life time of the membrane we recommend to install a Reflex V intermediate tank before the expansion vessel if the return flow is > 70°C

1) Reflex G, expansion vessel for boiler circuit
2) Reflex Storatherm Aqua Solar hot water heater
3) Refix DD, Sanitary expansion vessel
4) Reflex Exvoid T Solar, Airvent for solar circuit
5) Reflex S, Expansion vessel for solar system
6) Reflex V, Intermediate tank
7) Reflex Longtherm, Heat Exchanger
8) Refix DE, Expansion Vessel
9) Sinus Manifold
10) Refix DE, Booster Expansion Vessel
11) Reflex Inlet Security Group
12) Reflex Exvoid Air Separator - Brass
13) Reflex AG Connection Set
14) Reflex Lockshield
15) Reflex Exdirt Separator - Steel
16) Reflex Exvoid Air Separator - Steel
17) Reflex N Expansion vessel