



'reflex'
Diaphragm expansion vessels for heating,
solar and cooling water applications



'reflex'

The professional way to keep up the pressure

Proven in the past and looking to the future:

'reflex,' the versatile diaphragm expansion vessel for closed-loop heating, solar, and cooling water circuits, works on the principle of static pressure maintenance using a nitrogen cushion. The gas space and water space are separated by a diaphragm.

'reflex' offers a sound design, and reliable operation without the need for auxiliary energy. The reflex 'control' and reflex 'servitec' make-up and degassing systems are useful ways to increase system automation.

All 'reflex' models feature a high-quality coating in either standard red or white depending on the model and size.



'reflex F': perfect for any boiler

The 'reflex F' is white and flat, making it extremely adaptable for use with wall-mounted boilers. Special models with an individual vessel geometry are also available.

8 – 24 l 3 bar/120 °C*



'reflex N, NG and G': vessels for heating and cooling circuits

These expansion vessels are renowned for their versatility: they are suitable for use in individual homes as well as complexes for living space and industrial applications. Vessels with a nominal volume of up to 1,000 liters are supplied with either an exchangeable (type G) or fixed (type N, NG) diaphragm; nominal volumes above this are only available with an exchangeable diaphragm.

8 – 10,000 l 3/6/10/16 bar/120 °C*



'reflex S': vessels for solar, heating, and cooling circuits

'reflex S' has been specially designed for use in solar heating systems with a high proportion of antifreeze. Available in red and white, it is of course also ideal for use in both heating and cooling systems.

2 – 600 l 10 bar/120 °C*

(* vessel 120 °C, diaphragm 70 °C)



The right expansion vessel for every application

'reflex F'

- ▶ For direct installation in the boiler
- ▶ As an extension vessel outside the boiler



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'reflex N, NG' and 'reflex S'

- ▶ Two products from a range offering outstanding expansion



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Reflex water make-up and degassing systems – the logical 'reflex' add-on

- ▶ Controlled water make-up
- ▶ Pressure indicator
- ▶ Central system degassing



 **reflex 'servitec'**
Degassing
and water make-up



 **reflex 'control'**
Water make-up
systems



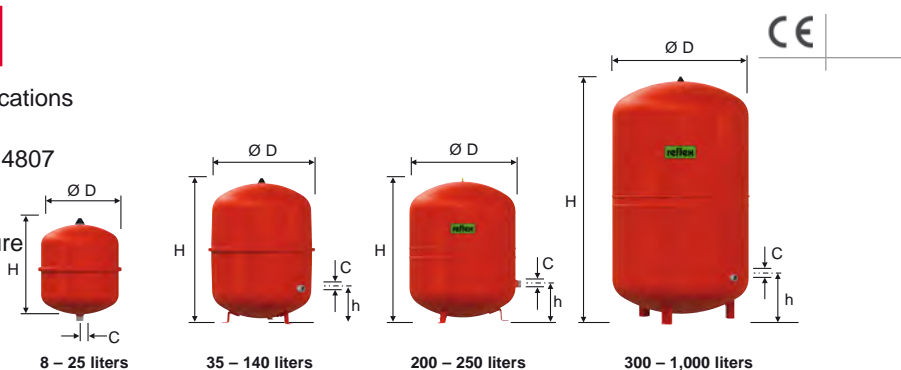
"Why did I choose 'reflex'? It has it all: variety, quality, and a presence within this specialist trade!"

'reflex'

Technical data

'reflex N + NG'

- ▶ For heating and cooling water applications
- ▶ Threaded connections
- ▶ Diaphragm in accordance with DIN 4807 part 3, max. operating temperature 70 °C
- ▶ Approval in accordance with pressure equipment directive 97/23/EC
- ▶ Colour: red or white; durable powder coating
- ▶ Pre-set pressure 1.5 bar



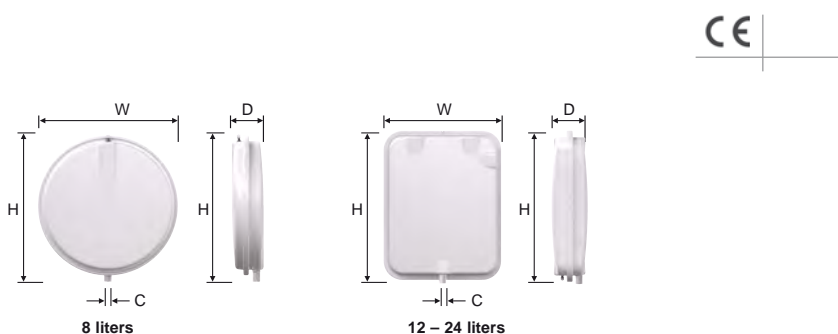
Type	Article-No.		Weight kg	Ø D mm	H mm	h mm	C
	red	white					
6 bar / 120 °C							
NG 8	7230100	7230107	1.7	206	285	---	R ¾
NG 12	7240100	7240107	2.3	280	275	---	R ¾
NG 18	7250100	7250107	2.8	280	345	---	R ¾
NG 25	7260100	7260107	3.5	280	465	---	R ¾
NG 35	7270100	7270107	5.7	354	460	130	R ¾
NG 50	7001000	7001100	7.5	409	493	175	R ¾
NG 80	7001200	7001300	9.9	480	565	175	R 1
NG 100	7001400	7001500	11.2	480	670	175	R 1
NG 140	7001600	7001700	14.5	480	912	175	R 1

Type	Article-No.	Weight kg	Ø D mm	H mm	h mm	C
6 bar / 120 °C						
N 200	7213300	---	634	760	205	R 1
N 250	7214300	---	634	890	205	R 1
N 300	7215300	---	634	1060	235	R 1
N 400	7218000	---	740	1070	245	R 1
N 500	7218300	---	740	1290	245	R 1
N 600	7218400	---	740	1530	245	R 1
N 800	7218500	---	740	1995	245	R 1
N 1000	7218600	---	740	2410	245	R 1

↑ V_n Nominal volume [Litres]

'reflex F'

- ▶ Flat vessel for heating and cooling water applications, especially suited for installation within the boiler
- ▶ Diaphragm in accordance with DIN 4807 part 3, max. operating temperature 70 °C
- ▶ Vessels ≥ 18 liters supplied with wall-hung clip
- ▶ Approval in accordance with pressure equipment directive 97/23/EC
- ▶ Colour: white; durable powder coating

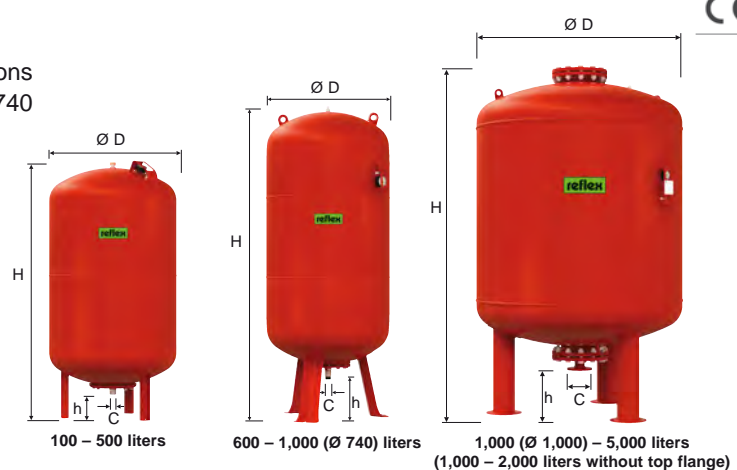


Type	Article-No.	Weight kg	H mm	W mm	D mm	C	Pre-set pressure bar
3 bar/120 °C							
F 8	9600011	6.5	389	389	88	G ⅝	0.75
F 12	9600030	8.5	444	350	108	G ½	1.0
F 15	9600040	9.0	444	350	134	G ¾	
F 18	9600000	9.5	444	350	158	G ¾	
F 24	9600010	9.8	444	350	180	G ¾	

↑ V_n Nominal volume/liters

'reflex G'

- ▶ For heating and cooling water applications
- ▶ Threaded connections up to 1,000 l Ø 740
- ▶ Flange connections
PN 6 at 6 bar, PN 16 at 10 bar
- ▶ Bladder in accordance with
DIN 4807 part 3, max. operating
temperature 70 °C
- ▶ Approval in accordance with pressure
equipment directive 97/23/EC
- ▶ Inspection port
- ▶ Pressure gauge in nitrogen space
- ▶ Colour: red; durable powder coating
- ▶ Pre-set pressure 3.5 bar



Type	Article-No.	Weight kg	Ø D mm	H mm	h mm	C
6 bar/120 °C						
G 400	7521605	51.0	740	1,253	146	G 1
G 500	7521705	59.0	740	1,473	146	G 1
G 600	7522605	74.0	740	1,718	146	G 1
G 800	7523610	102.0	740	2,183	146	G 1
G 1000 Ø 740	7546605	158.0	740	2,593	146	G 1
G 1000 Ø 1,000	7524605	248.0	1,000	1,975	305	DN 65/PN 6
G 1500	7526605	297.0	1,200	1,975	305	DN 65/PN 6
G 2000	7527605	370.0	1,200	2,430	305	DN 65/PN 6
G 3000	7544605	640.0	1,500	2,480	335	DN 65/PN 6
G 4000	7529605	828.0	1,500	3,055	335	DN 65/PN 6
G 5000	7530605	905.0	1,500	3,590	335	DN 65/PN 6

Type	Article-No.	Weight kg	Ø D mm	H mm	h mm	C
10 bar/120 °C						
G 100	7518000	16.5	480	856	152	G 1
G 200	7518100	36.5	634	972	144	G 1¼
G 300	7518200	41.6	634	1,267	144	G 1¼
G 400	7521005	59.0	740	1,245	133	G 1¼
G 500	7521006	65.1	740	1,475	133	G 1¼
G 600	7522006	128.0	740	1,859	263	G 1½
G 800	7523005	176.0	740	2,324	263	G 1½
G 1000 Ø 740	7546005	214.0	740	2,604	263	G 1½
G 1000 Ø 1,000	7524005	355.0	1,000	2,000	290	DN 65/PN 16
G 1500	7526005	410.0	1,200	2,000	290	DN 65/PN 16
G 2000	7527005	505.0	1,200	2,450	290	DN 65/PN 16
G 3000	7544005	870.0	1,500	2,580	320	DN 65/PN 16
G 4000	7529005	1,120.0	1,500	3,070	320	DN 65/PN 16
G 5000	7530005	1,330.0	1,500	3,610	320	DN 65/PN 16

↑ — V_n Nominal volume/liters

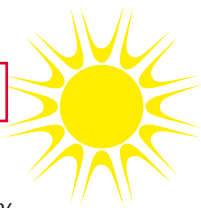
'reflex G' – special versions available on request

- ▶ Special vessel > 5,000 liters
- ▶ Special vessel > 10 bar
- ▶ Individual approval from a notified body in accordance
with pressure equipment directive 97/23/EC

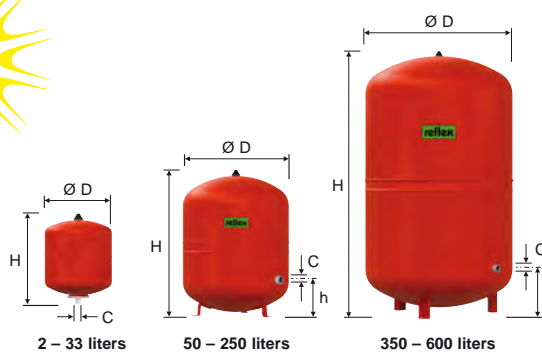
'reflex'

Technical data

'reflex S'



- ▶ For solar, heating, and cooling water applications
- ▶ For antifreeze additive of up to 50 %
- ▶ Threaded connections
- ▶ Diaphragm in accordance with DIN 4807 part 3, max. operating temperature 70 °C
- ▶ 33 liters with wall-hung clip
- ▶ Approval in accordance with pressure equipment directive 97/23/EC
- ▶ Colour: red or white; durable powder coating

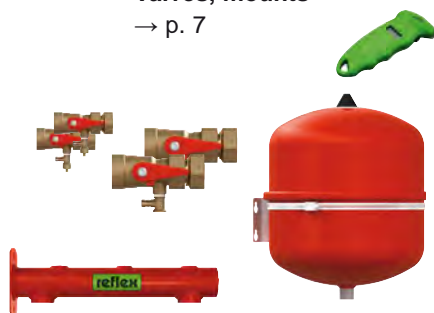


CE

Type	Article-No.		Weight kg	Ø D mm	H mm	h mm	C	Pre-set pressure bar
	red	white						
S 2	9707700	---	1.1	132	260	---	G 3/4	0.5
S 8	9703900	9702600	2.5	206	325	---	G 3/4	1.5
S 12	9704000	9702700	3.5	280	300	---	G 3/4	
S 18	9704100	9702800	4.5	280	380	---	G 3/4	
S 25	9704200	9702900	5.5	280	500	---	G 3/4	
S 33	9706200	9706300	6.3	354	450	---	G 3/4	
S 50	7209500	---	13.2	409	469	168	R 3/4	3.0
S 80	7210300	---	18.4	480	538	166	R 1	
S 100	7210500	---	22.7	480	644	166	R 1	
S 140	7211500	---	29.0	480	886	166	R 1	
S 200	7213400	---	40.0	634	760	205	R 1	
S 250	7214400	---	48.0	634	890	205	R 1	
S 300	7215400	---	54.0	634	1,060	235	R 1	
S 400	7219000	---	78.0	740	1,070	245	R 1	
S 500	7219100	---	80.0	740	1,290	245	R 1	
S 600	7219200	---	103.0	740	1,530	245	R 1	

↑ V_n Nominal volume/liters

Valves, mounts
→ p. 7



Water make-up, degassing
→ p. 8, 9

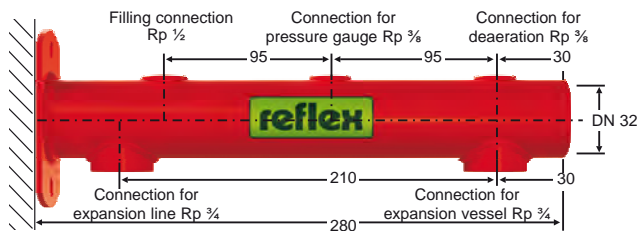


reflex 'Wall hung holder' for 'reflex' 8 – 25 liters

'reflex' models up to 25 liters do not have their own feet. We recommend using a mount with these models. There are two versions available:

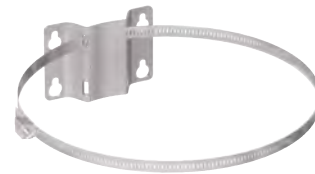
- ▶ Bracket with multiple connections, for 'reflex' 8 – 25 liters with a top vessel connection

Article-No.: 7612000



- ▶ Bracket with tightening strap for 'reflex' 8 – 25 liters, vertical assembly, top or bottom vessel connection

Article-No.: 7611000



Protected shut-off

DIN EN 12828: It must be possible to drain the water space in expansion vessels. All expansion vessels must be arranged such that they can be shut off from the heating system.

The dimensions of the lockshield valves can generally be selected in accordance with the nominal width of the vessel connection. You can find guideline values for acceptable heat output on page 11.

▶ reflex 'SU R 3/4' lockshield valve

- Protected shut-off used when disassembling expansion vessels
- Draining function
- In accordance with DIN EN 12828
- PN 10/120 °C

▶ reflex 'SU R 1' and 'AG' connection assembly

- For super-fast assembly and maintenance of diaphragm expansion vessels
- Incl. protected shut-off and elbow connector with screw connection
- With G 1/2 draining tap and hose nozzle in accordance with DIN EN 12828
- PN 16/120 °C
- Ideal for use with 'reflex G' 100 – 1000 Ø 740



AG



SU R 1

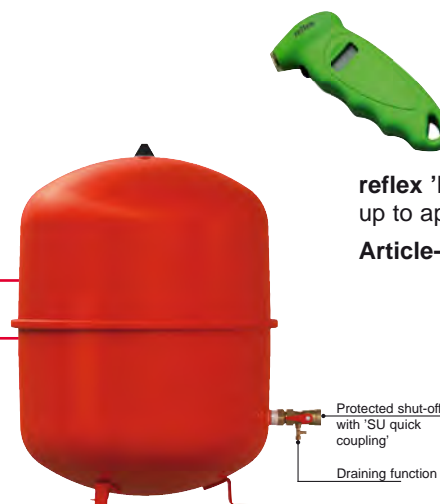


SU R 3/4

Type	Article-No.	Version
SU R 3/4	7613000	Lockshield valve
SU R 1	7613100	
AG 1	9119204	Connection assembly
AG 1 1/4	9119205	
AG 1 1/2	9119206	

reflex 'Digital pressure gauge'

DIN EN 12828: Expansion vessels must be serviced once a year. This must include checking the gas pre-set pressure p_0 with a valve when drained and making any necessary corrections.



reflex 'Digital pressure gauge'
up to approx. 9 bar

Article-No.: 9119198

reflex 'control' water make-up systems

The logical way to enhance your 'reflex'

reflex 'control' Water make-up systems... and more online, on DVD, and in an extra brochure

www.reflex.de

'reflex' is synonymous with simple construction and reliable, robust functionality. However, operating faults may still occur if, for example, the heating system is not made up with enough water at the right time. This means that the water seal required for operation is not present.

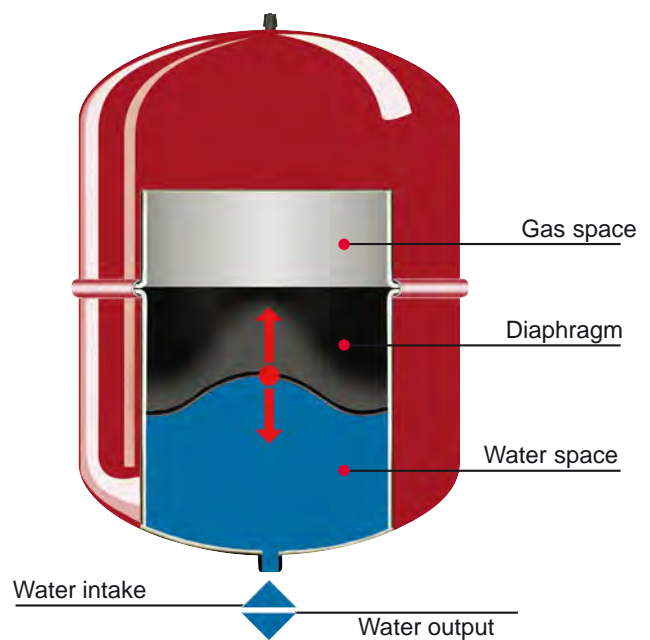
This is where reflex 'control' make-up stations have shown themselves to be a logical addition to the 'reflex.' By monitoring and displaying the pressure and offering controlled water make-up, they ensure that the 'reflex' always has the required water seal.

With reflex 'magcontrol' or 'control P': everything runs at its best

- ▶ 'magcontrol' or, if the water make-up pressure is insufficient, 'control P' monitors the diaphragm expansion vessel (DEV) pressure and makes up the water as required
- ▶ The expansion vessel constantly has the amount of water it needs

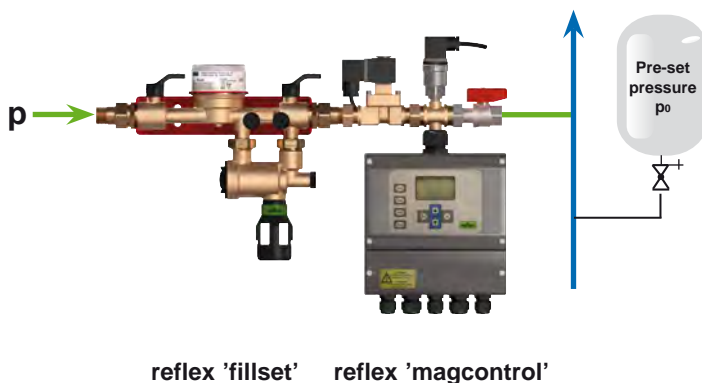
The result:

- ▶ Optimum system pressure
- ▶ The diaphragm can move freely to allow water to be both drawn in and fed out
- ▶ No risk of air problems
- ▶ Controlled make-up volumes
- ▶ 'control P' and 'magcontrol' with reflex 'fillset' meet the requirements of the new DIN EN 1717



8

reflex 'magcontrol'
Make-up station with no pump



reflex 'fillset' reflex 'magcontrol'

Minimum flow pressure

$$p \geq p_0 + 1.3 \text{ bar}$$

reflex 'control P'
Make-up station with pump



reflex 'control P'

Article-No.
reflex 'magcontrol' 6812100
reflex 'fillset' 6811100

Article-No.: 7688500

reflex 'servitec' degassing systems

The add-on to ensure optimum operation

reflex 'servitec' degassing systems... and more online, on DVD, and in an extra brochure

www.reflex.de

The issue of air problems in heating and cooling circuits is something known to every expert in the field through experience. It is something that affects over 50% of all systems, according to a study by Dresden University of Technology. reflex 'servitec' automatically ensures central degassing right through to the highest, most remote corner, monitors the 'reflex' expansion vessel, and makes up the water as required.

reflex 'servitec' – your true 'savings' system: No expensive installation and maintenance of multiple decentralized mechanical air separators, no costly post-ventilation; instead, operations management is automatic and optimized.

'reflex' + 'servitec' the alternative pressure-maintaining station with outstanding service

For systems featuring diaphragm expansion vessels (e.g. 'reflex N'), a combination featuring reflex 'servitec' is a cost-effective alternative to conventional pressure-maintaining stations with water make-up and degassing.

'reflex' + 'servitec' ensures:

Constantly elastic pressure despite degassed circuit water

+

The benefits of the outstanding 'servitec' service

- ▶ Central deaeration and degassing of the circuit water
- ▶ Controlled water make-up with simultaneous degassing
- ▶ Pressure display and control
- ▶ Data transfer via floating contact and RS-485 interface

reflex 'servitec' is also ideal for retrofitting in problematic systems.

reflex 'servitec 25'
reflex 'servitec 35'
reflex 'servitec 60'
reflex 'servitec 60/gl'

Article-No.
6830700
6820100
6820200
6820300



reflex 'servitec'
for systems > 2 m³

'reflex G'



reflex 'servitec 25'
for systems ≤ 2 m³



'reflex' Selection

Heating systems

90°C Flow temperature

70°C Return flow temperature

Planning, calculation, fitting... and more
online, on DVD, and in an extra brochure

www.reflex.de

p _{sv} Safety valve on the heat generator →	p _{sv} bar	2.5			V _n				3.0					
		0.5	1.0	1.5	Liters	0.5	1.0	1.5	1.8					
p ₀ Gas pre-set pressure in expansion vessel →	p ₀ bar													
V _A Max. water content in system	V _A Liters	65	30	---	8	85	50	19	---					
p _F Minimum filling pressure of cold, degassed system	p _F bar	1.0	1.6	---	12	1.1	1.6	2.2	---					
	V _A Liters	100	45	---	15	120	75	29	---					
	p _F bar	1.0	1.6	---	18	1.1	1.6	2.2	---					
	V _A Liters	130	55	---	25	160	95	36	---					
	p _F bar	1.0	1.6	---	33	1.1	1.6	2.2	---					
	V _A Liters	170	85	---	35	200	130	60	17					
	p _F bar	0.9	1.5	---	50	1.0	1.5	2.1	2.4					
	V _A Liters	270	150	33	80	320	220	120	55					
	p _F bar	0.9	1.4	1.9	100	0.9	1.4	1.9	2.2					
	V _A Liters	380	220	70	140	440	310	180	100					
	p _F bar	0.8	1.3	1.8	200	0.8	1.4	1.9	2.2					
	V _A Liters	400	240	80	250	470	340	200	110					
	p _F bar	0.8	1.3	1.8	300	0.8	1.4	1.9	2.1					
	V _A Liters	610	380	130	400	700	510	320	200					
	p _F bar	0.8	1.3	1.8	500	0.8	1.3	1.8	2.1					
	V _A Liters	980	610	210	600	1,120	840	540	320					
	p _F bar	0.8	1.3	1.8	800	0.8	1.3	1.8	2.1					
	V _A Liters	1,230	760	260	1,000	1,400	1,050	670	410					
	p _F bar	0.8	1.3	1.8	1,400	0.8	1.3	1.8	2.1					
	V _A Liters	1,720	1,070	360	1,500	1,960	1,470	940	570					
	p _F bar	0.8	1.3	1.8	200	0.8	1.3	1.8	2.1					
	V _A Liters	2,450	1,530	520	250	2,800	2,100	1,340	810					
	p _F bar	0.8	1.3	1.8	300	0.8	1.3	1.8	2.1					
	V _A Liters	3,060	1,910	650	400	3,500	2,630	1,670	1,010					
	p _F bar	0.8	1.3	1.8	500	0.8	1.3	1.8	2.1					
	V _A Liters	3,680	2,290	780	600	4,200	3,150	2,010	1,220					
	p _F bar	0.8	1.3	1.8	800	0.8	1.3	1.8	2.1					
	V _A Liters	4,900	3,050	1,040	1,000	5,600	4,200	2,680	1,620					
	p _F bar	0.8	1.3	1.8	1,500	0.8	1.3	1.8	2.1					
	V _A Liters	6,130	3,820	1,300	2,000	7,000	5,250	3,350	2,030					
	p _F bar	0.8	1.3	1.8	3,000	0.8	1.3	1.8	2.1					
	V _A Liters	7,350	4,580	1,560	4,000	8,400	6,300	4,020	2,430					
	p _F bar	0.8	1.3	1.8	5,000	0.8	1.3	1.8	2.1					
	V _A Liters	9,800	6,110	2,080	6,000	11,200	8,400	5,350	3,240					
	p _F bar	0.8	1.3	1.8	8,000	0.8	1.3	1.8	2.1					
	V _A Liters	11,310	7,630	2,600	1,000	10,600	10,500	6,690	4,050					
	p _F bar	0.8	1.3	1.8	1,500	0.8	1.3	1.8	2.1					
	V _A Liters	18,380	11,450	3,900		21,000	15,750	10,040	6,080					
	p _F bar	0.8	1.3	1.8		0.8	1.3	1.8	2.1					

Standard circuit

▶ Recommendation for safety valves:

$$p_{sv} \geq p_0 + 1.5 \text{ bar}$$

▶ Pre-set pressure calculation $t \leq 100 \text{ }^\circ\text{C}$:

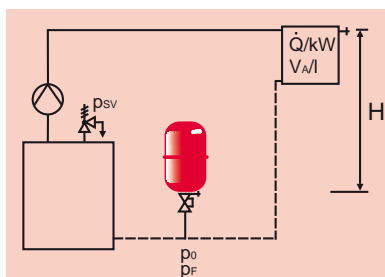
$$p_0 \geq p_0 \frac{H \text{ [m]}}{10} + 0.2 \text{ bar}$$

Reflex – recommendation

$$p_0 \geq 1 \text{ bar}$$

▶ Filling pressure calculation using the optimized Reflex formula:

$$p_F \geq p_0 + 0.3 \text{ bar}$$



▶ Approximate water content:

Radiators

$$V_A = \dot{Q} \text{ [kW]} \times 13.5 \text{ l/kW}$$

Flat radiators

$$V_A = \dot{Q} \text{ [kW]} \times 8.5 \text{ l/kW}$$

Example

$$p_{sv} = 5 \text{ bar}$$

$$H = 23 \text{ m}$$

$$\dot{Q} = 600 \text{ kW, radiators, 90/70}^\circ\text{C}$$

Calculation:

$$\rightarrow V_A = 600 \text{ kW} \times 13.5 \text{ l/kW} = 8,100 \text{ l}$$

$$\rightarrow p_0 = \left(\frac{23}{10} + 0.2 \text{ bar} \right) = 2.5 \text{ bar}$$

From the table:

$$\text{Where } p_{sv} = 5 \text{ bar, } p_0 = 2.5 \text{ bar, } V_A = 8,100 \text{ l}$$

$$\rightarrow V_n = 1,000 \text{ l (for } V_A \text{ max. 8,910 l)}$$

Selected:
Version 1 – 'reflex G'



1 x 'reflex G 1000', 6 bar → p. 5

- Exchangeable bladder

- Threaded connection

1 x 'AG 1' connection assembly → p. 7

Expansion lines

Expansion line	DN 20 ¾"	DN 25 1"	DN 32 1¼"	DN 40 1½"	DN 50 2"	DN 65	DN 80	DN 100
Q/kW Length ≤ 10 m	350	2,100	3,600	4,800	7,500	14,000	19,000	29,000
Q/kW Length > 10 m ≤ 30 m	350	1,400	2,500	3,200	5,000	9,500	13,000	20,000

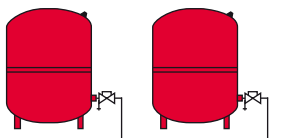
Protected shut-offs

We recommend the following for standard systems:
 DEV with threaded connections R ¾ and R 1
 → reflex 'SU Lockshield valve'
 with DEV dimensions
 DEV with flange connections
 → with expansion line dimensions

p _{sv} bar	3.5				V _n Liters	4.0				V _n Liters	5.0			
	1.5	1.8	2.0	2.5		1.5	2.0	2.5	3.0		2.0	2.5	3.0	3.5
p ₀ bar					8					8				
V _A Liters	39	22	11	---	8	55	30	5	---	8	55	37	16	---
p _F bar	2.3	2.6	2.8	---	8	2.3	2.9	3.4	---	8	3.0	3.5	4.1	---
V _A Liters	60	34	17	---	12	80	45	7	---	12	85	55	24	---
p _F bar	2.3	2.6	2.8	---	12	2.3	2.9	3.4	---	12	3.0	3.5	4.1	---
V _A Liters	75	42	21	---	15	100	55	9	---	15	110	70	30	---
p _F bar	2.3	2.6	2.8	---	15	2.3	2.9	3.4	---	15	3.0	3.5	4.1	---
V _A Liters	100	65	42	---	18	140	85	28	---	18	140	100	55	8
p _F bar	2.1	2.5	2.7	---	18	2.2	2.7	3.3	---	18	3.0	3.4	3.9	4.4
V _A Liters	180	130	90	3	25	230	150	70	---	25	230	170	110	43
p _F bar	2.0	2.3	2.5	3.0	25	2.1	2.6	3.1	---	25	2.7	3.2	3.7	4.2
V _A Liters	260	190	150	31	33	330	220	120	19	33	340	250	170	85
p _F bar	1.9	2.2	2.4	2.9	33	2.1	2.5	3.0	3.4	33	2.6	3.1	3.6	4.0
V _A Liters	280	210	160	38	35	350	240	130	25	35	360	270	180	95
p _F bar	1.9	2.2	2.4	2.9	35	2.0	2.5	2.9	3.4	35	2.5	3.1	3.5	4.0
V _A Liters	440	340	270	90	50	540	380	230	70	50	550	420	300	170
p _F bar	1.8	2.1	2.3	2.8	50	1.9	2.4	2.8	3.3	50	2.5	3.0	3.4	3.9
V _A Liters	540	590	470	160	80	870	650	410	140	80	890	710	530	320
p _F bar	1.8	2.1	2.3	2.8	80	1.9	2.3	2.8	3.3	80	2.4	2.9	3.4	3.8
V _A Liters	740	740	590	200	100	1,090	820	530	180	100	1,110	890	670	420
p _F bar	1.8	2.1	2.3	2.8	100	1.9	2.3	2.8	3.3	100	2.4	2.9	3.3	3.8
V _A Liters	920	1,030	830	280	140	1,520	1,140	750	250	140	1,560	1,250	940	620
p _F bar	1.8	2.1	2.3	2.8	140	1.9	2.3	2.8	3.3	140	2.4	2.9	3.3	3.8
V _A Liters	1,840	1,470	1,190	400	200	2,180	1,630	1,070	360	200	2,230	1,780	1,340	890
p _F bar	1.8	2.1	2.3	2.8	200	1.9	2.3	2.8	3.3	200	2.4	2.9	3.3	3.8
V _A Liters	2,300	1,840	1,490	500	250	2,720	2,040	1,340	450	250	2,780	2,230	1,670	1,110
p _F bar	1.8	2.1	2.3	2.8	250	1.9	2.3	2.8	3.3	250	2.4	2.9	3.3	3.8
V _A Liters	3,220	2,210	1,780	600	300	3,270	2,450	1,600	540	300	3,340	2,670	2,000	1,330
p _F bar	1.8	2.1	2.3	2.8	300	1.9	2.3	2.8	3.3	300	2.4	2.9	3.3	3.8
V _A Liters	3,680	2,940	2,380	800	400	4,360	3,270	2,140	720	400	4,460	3,560	2,670	1,780
p _F bar	1.8	2.1	2.3	2.8	400	1.9	2.3	2.8	3.3	400	2.4	2.9	3.3	3.8
V _A Liters	4,590	3,680	2,970	1,000	500	5,450	4,080	2,670	900	500	5,570	4,460	3,340	2,220
p _F bar	1.8	2.1	2.3	2.8	500	1.9	2.3	2.8	3.3	500	2.4	2.9	3.3	3.8
V _A Liters	5,510	4,410	3,570	1,200	600	6,530	4,900	3,210	1,080	600	6,680	5,350	4,010	2,660
p _F bar	1.8	2.1	2.3	2.8	600	1.9	2.3	2.8	3.3	600	2.4	2.9	3.3	3.8
V _A Liters	7,350	5,880	4,760	1,600	800	8,710	6,530	4,270	1,440	800	8,910	7,130	5,350	3,550
p _F bar	1.8	2.1	2.3	2.8	800	1.9	2.3	2.8	3.3	800	2.4	2.9	3.3	3.8
V _A Liters	9,190	7,350	5,950	2,000	1,000	10,890	8,170	5,340	1,800	1,000	11,140	8,910	6,680	4,440
p _F bar	1.8	2.1	2.3	2.8	1,000	1.9	2.3	2.8	3.3	1,000	2.4	2.9	3.3	3.8
V _A Liters	13,780	11,030	8,920	3,010	1,500	16,340	12,250	8,020	2,690	1,500	16,710	13,370	10,020	6,660
p _F bar	1.8	2.1	2.3	2.8	1,500	1.9	2.3	2.8	3.3	1,500	2.4	2.9	3.3	3.8

Version 2 – Battery circuit with 2x 'reflex N' – the cost-effective alternative

- 2x 'reflex N 500,' 6 bar → p. 4
- Fixed diaphragm
- Threaded connections
- Battery circuit set up on site
- 2x 'SU R1' cap ball valves → p. 7



It is possible to connect numerous 'reflex N' units to batteries. This is generally a cost-effective alternative to using larger vessels.



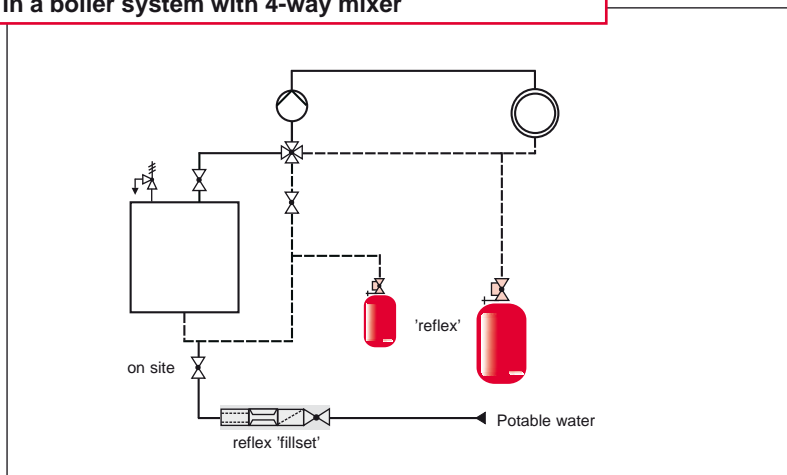
'reflex'

Sample installations

Notes for the installer – hydraulic integration

- ▶ In accordance with DIN EN 12828:
every heat generator must be connected to one or more expansion vessels by at least one expansion line.
- ▶ You should select the appropriate circuit as follows:
Diaphragm expansion vessel in boiler return – circulating pump in boiler flow line
 - Direct connection between DEV and heat generator
 - Low temperature load on diaphragm
 - DEV on the suction side of the circulation pump to minimize the risk of a vacuum forming
- ▶ **Please consult your specialist adviser in the event of any deviations!**

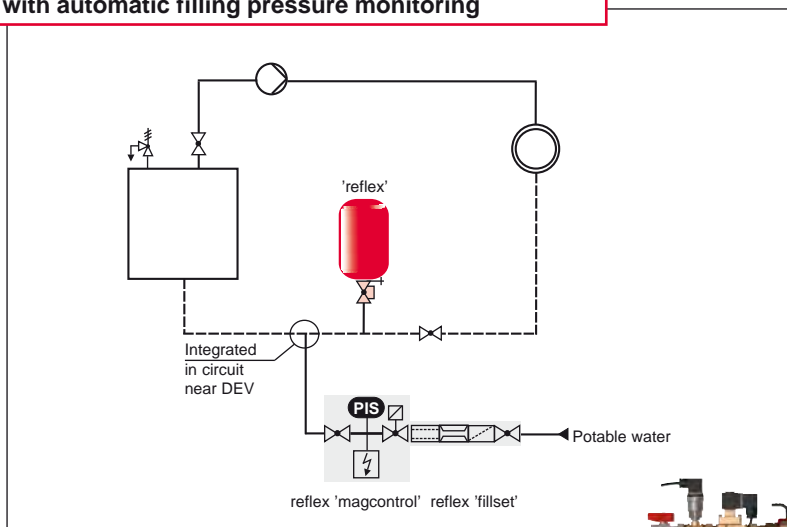
'reflex' in a boiler system with 4-way mixer



Notes for the installer

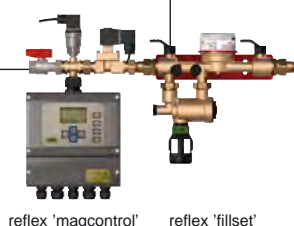
- ▶ The boiler and system each have an expansion vessel. This ensures that no vacuum can form in the system circuit, even with fully sealing mixers.
- ▶ reflex 'fillset' is a pre-packaged valve assembly providing a direct connection to potable water systems for making up and filling the system.
→ Page 8

'reflex' with automatic filling pressure monitoring



Notes for the installer

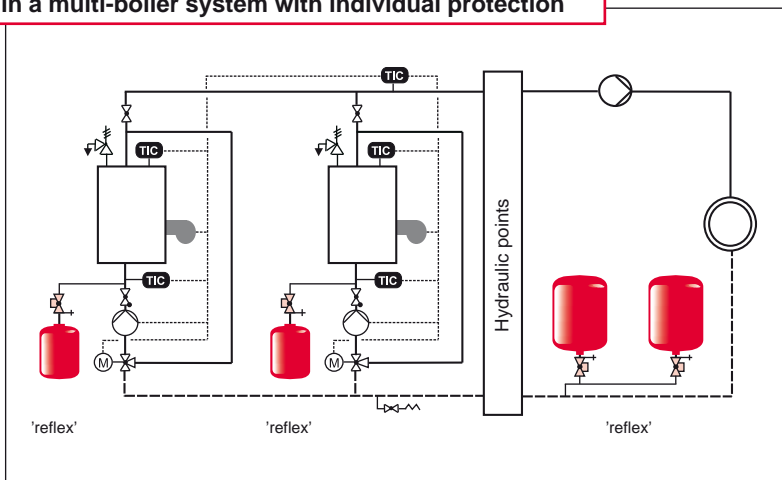
- ▶ A reflex 'magcontrol' make-up station provides optimum functional support for your 'reflex.' It ensures your expansion vessel always contains water, which minimizes vacuum formation and the ensuing air problems at high points.
- ▶ reflex 'fillset' with system separator and water meter is easy to connect upstream to provide a direct connection to the potable water system.
→ Page 8
→ Brochure for reflex 'control' make-up stations



Notes for the installer – multi-boiler systems

- ▶ In accordance with DIN EN 12828:
every heat generator must be connected to one or more expansion vessels by at least one expansion line.
- ▶ Which circuit should you choose?
You can have individual protection for each boiler through an expansion vessel, or opt for a common boiler and system protection option. When using shut-offs via boiler sequential circuits, you must ensure that the boiler in question is connected to at least one expansion vessel. It is always best to consult the boiler manufacturer.

'reflex N' – battery circuit in a multi-boiler system with individual protection

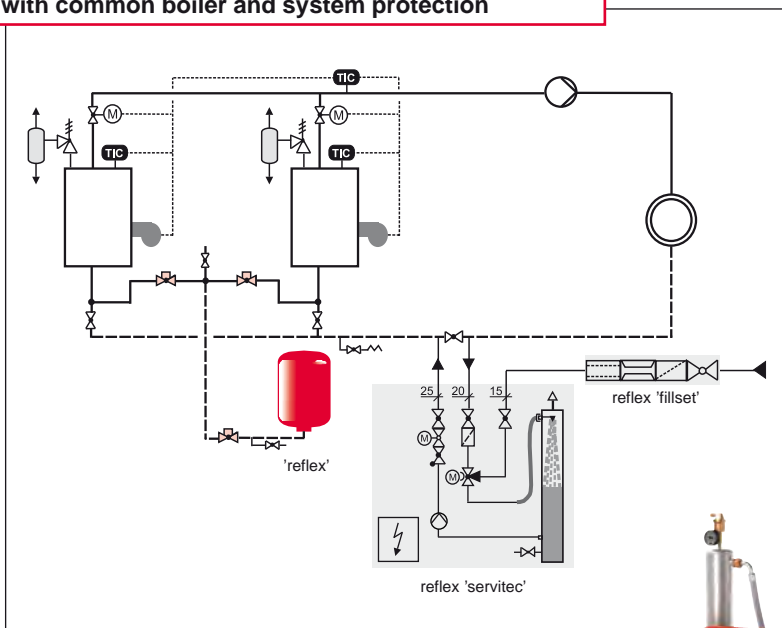


Notes for the installer

- ▶ Connecting numerous 'reflex N' 6 or 10 bar vessels to a battery circuit is usually a more cost-effective alternative to using larger 'reflex G' vessels.
- ▶ The burner is used to shut off the corresponding boiler circulating pump and close the motorized valve (M) via the temperature control (TIC). This enables the boiler to remain connected to the 'reflex.' It is the most frequently used circuit for boilers with a minimum return flow temperature, preventing boiler circulation when the burner is switched off.

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'reflex' in a multi-boiler system with common boiler and system protection



Notes for the installer

- ▶ When the burner is switched off, the corresponding actuator (M) is closed via the temperature control (TIC) while preventing unwanted circulation in the shut-off boiler. In addition, the boiler expansion line above the center of the boiler prevents gravity circulation. This option is ideally suited to systems without a minimum boiler return flow temperature (e.g. condensing systems).
 - ▶ Our reflex 'servitec' vacuum spray-tube degassing unit guarantees effective system service:
 - Displays and monitors pressure
 - Provides automatic making up and filling
 - Centrally degasses and bleeds the contained, filling, and make-up water
- P. 9
→ reflex 'servitec' brochure

The circuits must be adjusted to suit local conditions.



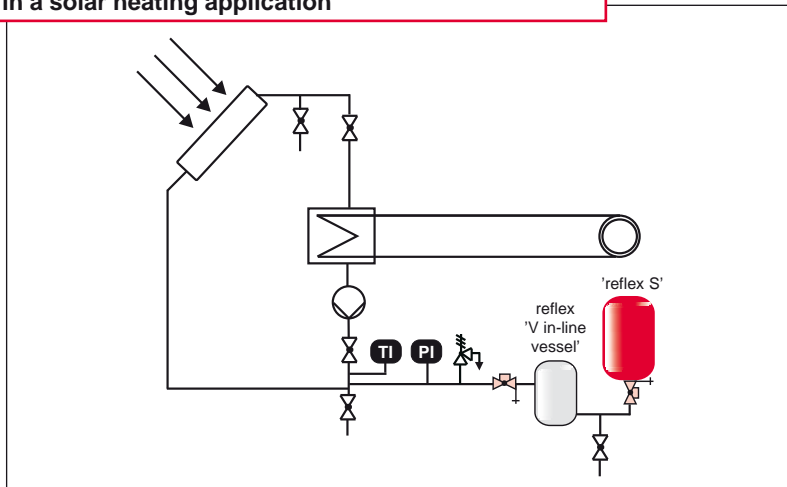
reflex 'servitec'
vacuum spray-tube degassing unit



'reflex'

Sample installations

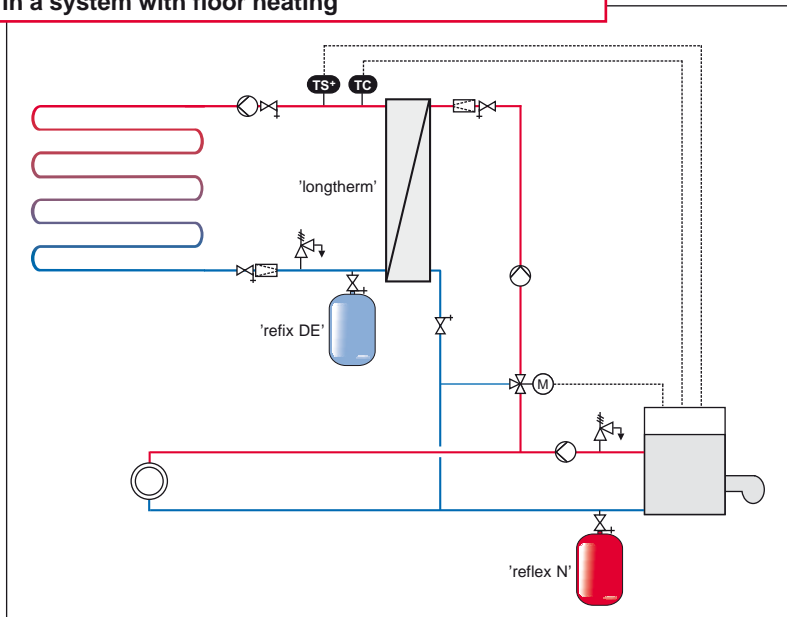
'reflex S' in a solar heating application



Notes for the installer

- ▶ Because of the low temperature load, the circulating pump and 'reflex S' are located in the collector return. This means that the expansion vessel must be installed on the pressure side of the circulating pump. **The circulating pump pressure must therefore be considered when calculating the pre-set pressure p_0 .**
- ▶ There is no need to install the reflex 'V in-line vessel' where the maximum possible temperature load for the expansion vessel is 70 °C.

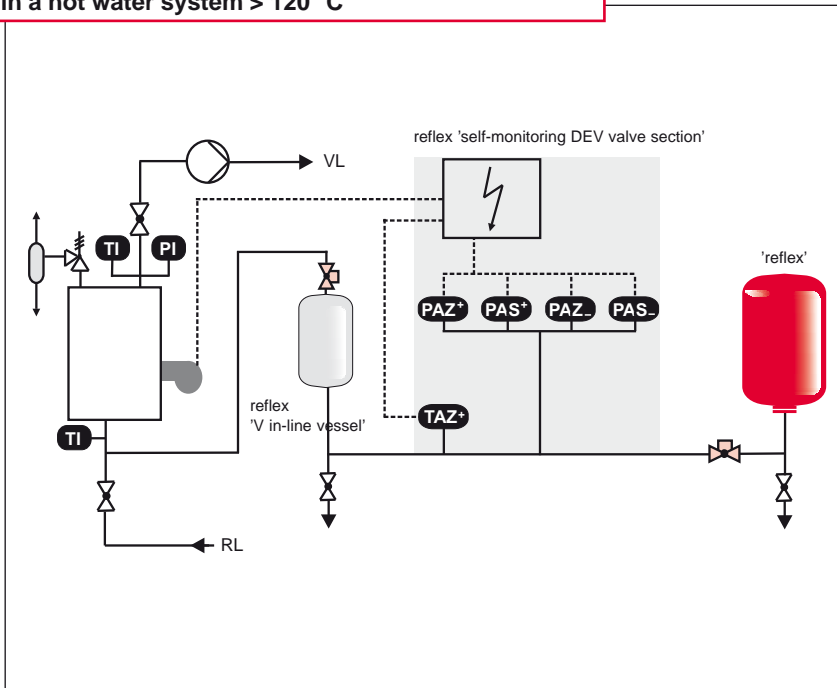
'reflex DE' in a system with floor heating



Notes for the installer

- ▶ If the floor heating circuit does not use **oxygen-tight** plastic tubing, there is a risk of corrosion.
- ▶ Even so, the safest option is to implement system separation between the boiler and floor circuit, e.g. with a reflex 'longtherm' plate heat exchanger. We recommend using the 'reflex DE' with special corrosion protection to prevent corrosion of the expansion vessel.
→ 'reflex' brochure

'reflex' DEV in a hot water system > 120 °C



Notes for the installer

- ▶ TRD 402, 18.6: The **actual operating temperature** can be used as the calculation temperature for expansion vessels and collection vessels.
- ▶ TRD 604 sheet. 2, 1.3.: There is no need to install a water level limiter with a DEV if a minimum pressure limiter is activated for the DEV when the water level drops below minimum.
- ▶ We recommend:
 - reflex 'V In-line vessel' > 120 °C with reflex 'self-monitoring DEV valve section,' each with a max/min pressure limiter (PAZ+ / PAZ-) and monitor (PAS+ / PAS-) plus a safety temperature limiter (TAZ+) to be installed on site.

'reflex'

Functionality, operation

Assembly, operating, and maintenance instructions... and more online, on DVD, and in an extra brochure

www.reflex.de

Excerpts from the assembly, operating, and maintenance instructions

Expansion vessels must be configured at start-up and be subjected to annual maintenance. This must include checking the gas pre-set pressure and system filling pressure and making adjustments to suit local conditions/planning specifications.

In order to perform maintenance on expansion vessels, DIN EN 12828 stipulates that: **there must be no lockshield valve between the expansion vessel and heat generator. The only possible option in this case is a lockshield valve protected against inadvertent closure for inspection purposes.**

We recommend the following to provide protected shut-off for 'reflex' for configuring the pre-set pressure:

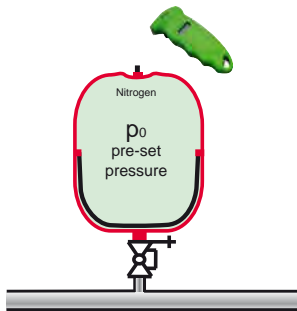
- reflex 'SU' and 'AG' lockshield valves → page 7
- reflex 'Digital pressure gauge' → page 7

The factory setting for the gas pre-set pressure is listed under the technical data for the individual 'reflex' models. For more detailed information, please refer to the assembly and operating instructions accompanying each vessel.



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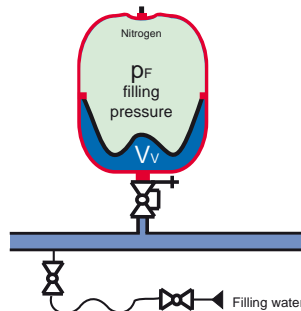
1 Configure pre-set pressure



The **gas pre-set pressure** p_0 must be adjusted to suit local conditions and entered on the name plate.

Pre-set pressure
 $p_0 \geq$ static pressure
 + 0.2 bar
 + evaporation pressure
 (where $t > 100 \text{ }^\circ\text{C}$)
 $p_0 \geq 1$ bar (recommended)

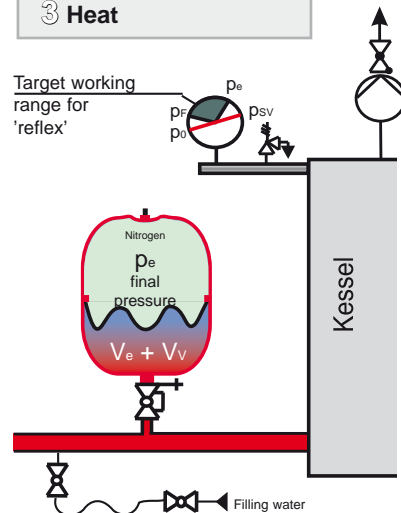
2 Fill



The **water seal** V_v is introduced cold when filling the system and is controlled via **filling pressure** p_F at the system pressure gauge on the water side after the system has been bled and degassed from cold.

Filling pressure
 $p_F \geq p_0 + 0.3$ bar

3 Heat



The system is thermally degassed once the max. flow temperature is reached. The circulating pumps must be switched off and the system bled. Water is then made up to **final pressure** p_e .

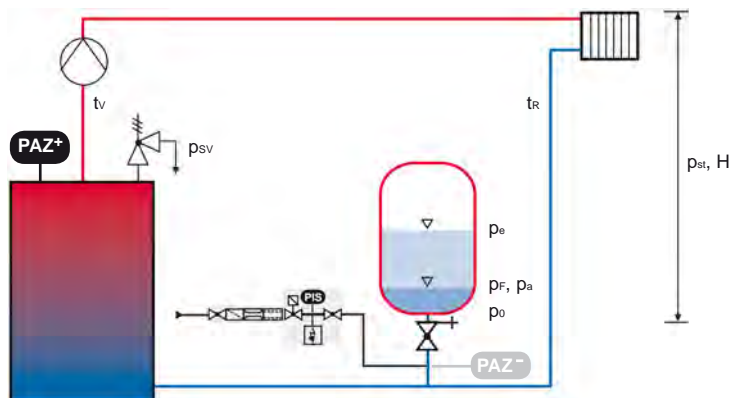
Final pressure
 $p_e \leq p_{sv} - 0.5$ bar, for $p_{sv} \leq 5$ bar
 $p_e \leq 0.9 \times p_{sv}$, for $p_{sv} > 5$ bar

Planning, calculation, fitting... and more online, on DVD, and in an extra brochure

www.reflex.de

Excerpts from the Reflex brochure on planning, calculation, and fitting

Definitions in accordance with DIN EN 12828 and following DIN 4807 T1/T2 using a heating system as an example



Most frequently used circuit:

- ▶ Circulating pump in flow line
- ▶ Expansion vessel in return

= Maintenance of suction pressure

Pressures and volumes using a DEV as an example

Pressures are given as overpressures and relate to the DEV connection or the pressure gauge on pressure-maintaining stations. The circuit is as per the sketch above.

p_{sv} Safety valve actuation pressure

The permissible operating pressure may not be exceeded at any point within the system.

PAZ⁺ = DB_{max} pressure limiter

Closing pressure difference in accordance with TRD 721 = A_{sv}

0.2 bar

DB_{max} required in accordance with DIN EN 12828, where a boiler's individual output is > 300 kW

p_e Final pressure

Pressure in the system at maximum temperature

Normal pressure range

= Pressure maintenance setpoint between p_a and p_e

p_F Filling pressure

Pressure in the system at filling temperature

Setpoint area pressure maintenance = normal pressure level

V_e Expansion volume

p_a Initial pressure

Pressure in the system at minimum temperature

Water seal V_v to cover system-related water losses

p_o Minimum operating pressure

Minimum pressure to avoid
- vacuum formation
- evaporation
- cavitation

= Pre-set pressure for DEV

PAZ⁻ = DB_{min} Minimum pressure limiter

≥ 0.3 bar

V_v Water seal

≥ 0.2 bar + p_o

DB_{min} in accordance with DIN EN 12828; an automatic water make-up system is recommended to ensure p_o in hot water systems, along with an optional minimum pressure limiter.

p_{st} Static pressure

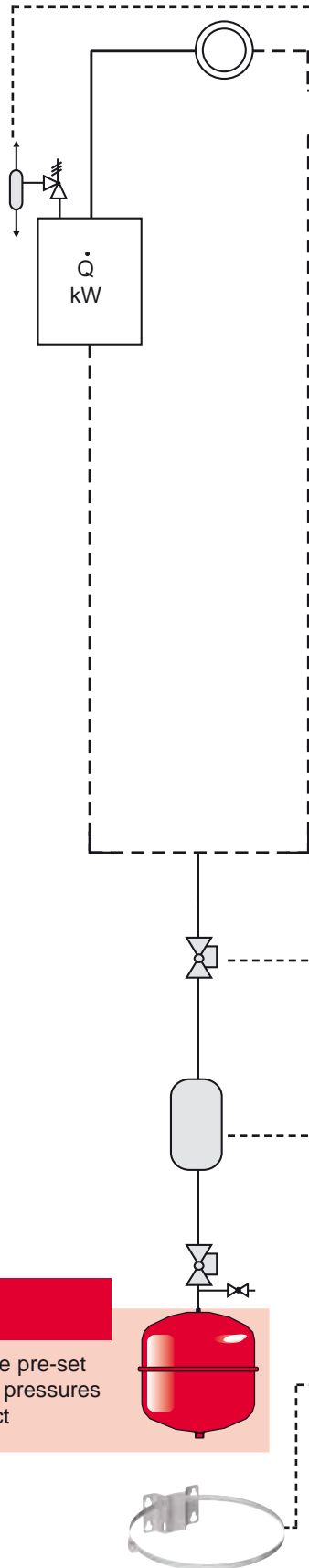
Pressure of liquid column in accordance with static height (H)



'reflex'

Checklist, expansion lines

Checklist



reflex 'T expansion trap'

Selection in accordance with DIN EN 12828
→ **reflex accessories** brochure

reflex 'EB dirt collector'

Ideal for older systems
→ **reflex accessories** brochure

reflex 'fillset'

Connection assembly providing access to potable water systems with water meter and system separator
→ **reflex 'control'** brochure

reflex 'magcontrol'

Filling pressure monitoring with automatic water make-up
→ **reflex 'control'** brochure

reflex 'control P'

Make-up station with pump
→ **reflex 'control'** brochure

reflex 'servitec'

Degassing of circuit and make-up water
→ **reflex 'servitec'** brochure

Protected shut-offs

For 'reflex'
→ Pages 7 and 11

reflex 'V in-line vessel'

Expansion vessel protection, only required where return flow temperatures t_R exceed 70 °C
→ **reflex accessories** brochure

'reflex'

Ensure the pre-set and filling pressures are correct

reflex 'wall mount'

for 'reflex' 8 – 25 liters
→ page 7

Order information, tender specifications

Order information

	Article-No.	Quantity	Order instructions
Diaphragm expansion vessels			
'reflex N' liters	.....		Choice of red or white up to 80 liters
'reflex G' liters	.....	
'reflex S' Liters	.....		Choice of red or white up to 33 liters
'reflex F' Liters	.....	
Accessories			
reflex 'wall mount' 8 – 25 liters			
Bracket with multiple connections	7612000		
Bracket with tightening strap	7611000		
Protected shut-offs			
reflex 'SU quick coupling'			
SU R ¾	7613000		
SU R 1	7613100		
reflex 'AG connection assembly'			
AG 1	9119204		
AG 1¼	9119205		
AG 1½	9119206		
reflex 'digital pressure gauge'	9119198		
reflex 'T expansion trap'			
..... Liters	.....	
reflex 'EB dirt collector'			
..... liters	.....	
reflex 'V in-line vessel'			
..... Liters	.....		For return flow temperatures > 70 °C
Water make-up and degassing			
reflex 'fillset'			
With standard water meter	6811105		
With contact water meter	6811205		
reflex 'fillcontrol'	6811500		
reflex 'magcontrol'	6812100		
reflex 'control P'	7688500		
reflex 'servitec 25'	6830700		System water content m ³
reflex 'servitec 35'	6829000		Proportion of glycol in water mixture %
reflex 'servitec 60'	6829100		Pressure maintenance final pressure bar
reflex 'servitec 60/gl'	6829700		Heat generator SV response pressure bar
'servitec' start-up	7945600		

Tender specifications... and more
online and on DVD!

www.reflex.de

Reflex –

We want the environment to benefit from our progress

Real progress is only achieved when man takes care of natural resources. Therefore, we favour materials and production technology which offer maximum environmental compatibility. Taking care of and assuming responsibility for the environment has been and will always be one of the principles of Reflex.



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