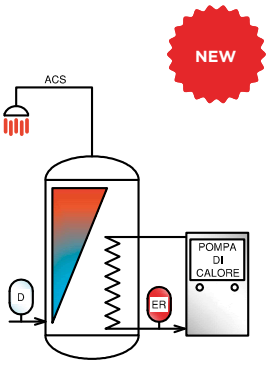
APPLICATIONS

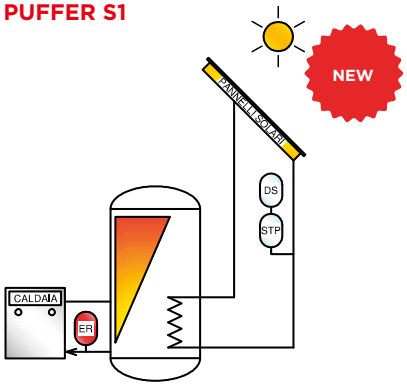
GLASSLINED CYLINDER FOR HEAT PUMP

BSP



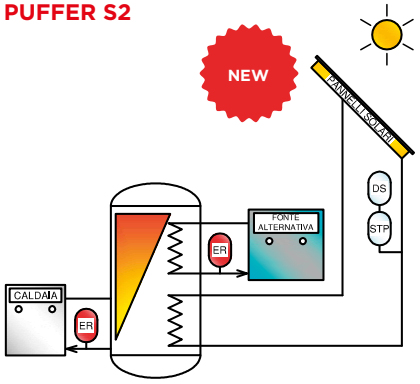
THERMAL FLYWHEEL WITH SINGLE HEAT EXCHANGER

PUFFER S1



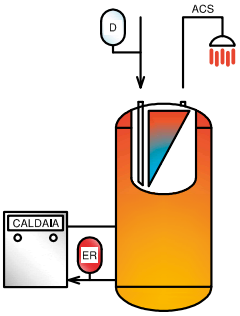
THERMAL FLYWHEEL WITH 2 HEAT EXCHANGERS

PUFFER S2

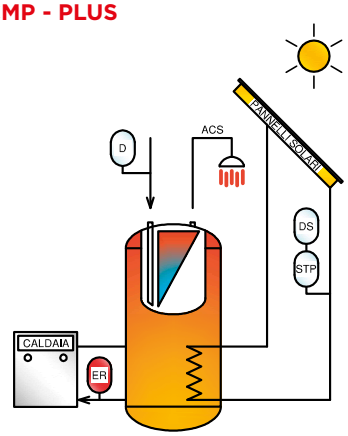


COMBI

CMS - STANDARD

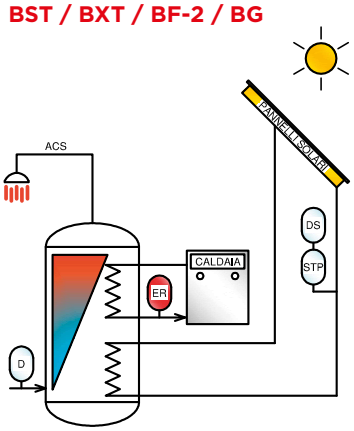


CMP - PLUS



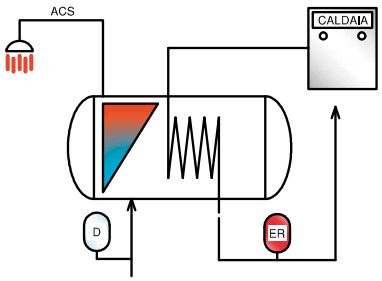
DHW CYLINDER WITH 2 HEAT EXCHANGERS

BST / BXT / BF-2 / BG

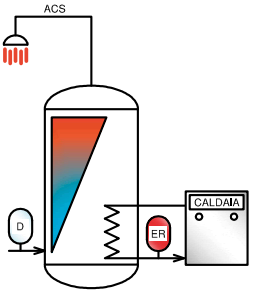


DHW CYLINDER WITH 1 HEAT EXCHANGER

BSH HORIZONTAL

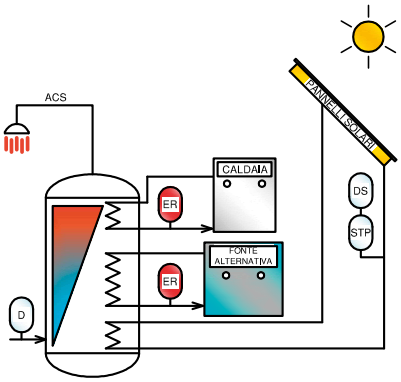


BSV / BSM / BXV / BF-1 / BG



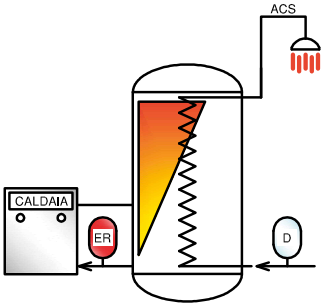
DHW CYLINDER WITH 3 HEAT EXCHANGERS

BF-3 / BG

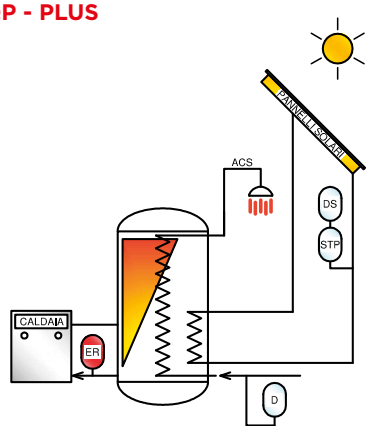


COMBI QUICK

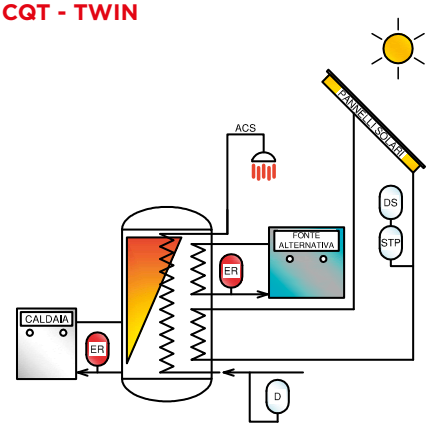
CQS - STANDARD



CQP - PLUS



CQT - TWIN

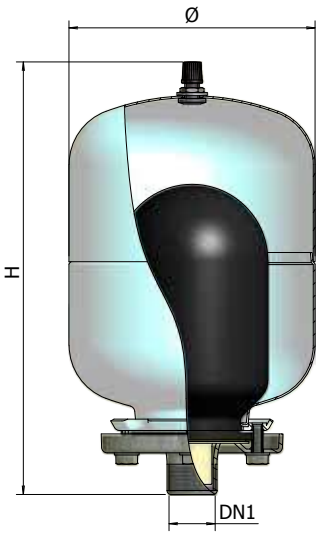


AC-2 / ER-CE

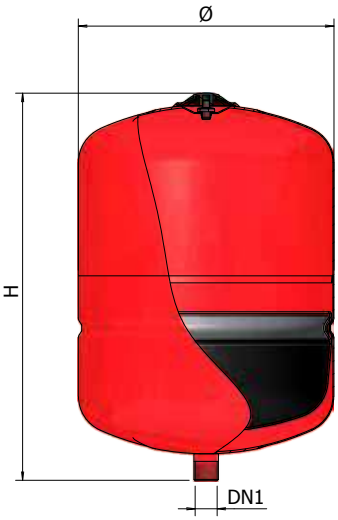
FIXED BLADDER EXPANSION TANKS FOR HEATING

(2 - 24 LITRES)

AC - 2



ER 5 - 24



CE CE certified product

For non-drinking water

For heating systems

For air conditioning systems

Characteristics:

• Working temperature: -10° / +99°C

• Long lasting epoxy powder paint, red.
(Model AC-2: white)

• Fixed bladder in SBR rubber
(Model AC-2: replaceable butyl bladder)

• Wall fixing bracket on request (see page 229)

Reference standard

• Declaration of conformity to essential safety requirements outlined by 2014/68/UE Directive.
Models AC-2/ER5 are exempt from CE marking.

WARRANTY: 2 YEARS

DIMENSIONS

MODEL	CODE	LITRES	Ppre bar	Pmax bar	max	mm	mm	DN1	mm	NOTES
AC-2 *	A012J07	2	2,5	8	+99°C	130	225	3/4"	150 x 150 x 240	
ER 5 *	A102L11	5	1,5	8	+99°C	205	215	3/4"	210 x 210 x 250	
ER 8 CE	A102L16	8	1,5	8	+99°C	205	280	3/4"	210 x 210 x 320	
ER 12 CE	A102L20	12	1,5	8	+99°C	270	300	3/4"	280 x 280 x 310	
ER 18 CE	A102L24	18	1,5	8	+99°C	270	410	3/4"	280 x 280 x 450	
ER 24 CE	A102L27	24	1,5	8	+99°C	320	330	3/4"	330 x 330 x 375	

* Exempt from CE marking

CHOICE OF THE EXPANSION TANK

The table simplifies the choice of the ELBI expansion tank to be installed in hot water systems. The selection of the tank can be effectuated starting from the system's total capacity or from the plant's power, taking into consideration an average content of 12 litres per 1000 Kcal/h of power and a plant's maximum working pressure of 3 bars

MODEL	PRE-CHARGE PRESSURE [BAR]	PLANT HEIGHT [m]	TANK ACCEPTABLE VOLUME [litri]	TANK ABSORPTION CAPACITY [%]	Δ T = (90 - 14)°C Δ expansion coefficient 0.035 TOTAL WATER CONTENT IN THE PLANT [litres]	HEAT GENERATOR POWER kcal/h	kW
AC-2	0,5	5	1,3	62,5	36	3.000	3,49
	1	10	1	50	29	2.400	2,79
ER 5	0,5	5	3,1	62	89	7.400	8,6
	1	10	2,5	50	71	5.900	6,86
ER 8 CE	0,5	5	5	62	143	11.900	13,84
	1	10	4	50	114	9.500	11,4
ER 12 CE	0,5	5	7,5	63	214	17.800	20,7
	1	10	6	50	171	14.250	16,57
ER 18 CE	0,5	5	11,3	63	323	26.900	31,3
	1	10	9	50	257	24.100	28,2
	1,5	15	6,7	37	191	15.900	118,5
ER 24 CE	0,5	5	15,5	65	443	36.900	43
	1	10	12	50	343	28.600	33,26
	1,5	15	9,3	39	266	22.200	25,82

SIZING OF A PRE-PRESSURISED EXPANSION TANK WITH BLADDER FOR HEATING SYSTEMS ("RACCOLTA_R", EDITION 2009)

The closed expansion tank volume must be sized in relation to the expansion volume of the water in the system.
The expansion volume (Ve) is the maximum variation of the water volume which can be in the system:

$$Ve = Va \cdot \frac{n}{100}$$

Where:
Va = total volume of the system [litres]
$n = 0.31 + 3.9 \cdot 10^{-4} \cdot tm^2$
tm = maximum permitted temperature in °C referring to safety device activation

The nominal volume Vn of the closed expansion tank with a bladder is calculated using the following formula:

$$Vn \geq \frac{Ve}{1 - \frac{P1}{P2}}$$

Where:
P1 = absolute pressure in bar to which the gas cushion pre-charge; pressure which should not be lower than the hydro-static pressure of the point in which the chamber is installed (or the recovery pressure of the filling unit). This absolute initial pressure value cannot be lower than 1.5 bar.
P2 = absolute calibration pressure of the safety valve, in bar, decreased by a quantity corresponding to the drop in the existing height difference between the expansion tank and the safety valve, if the latter is placed lower or increased if placed higher.

TABLES FOR THE TANK SELECTION

TAB. 1

SPECIFIC VOLUME OF THE WATER AT VARIOUS TEMPERATURES

T °C	U litres/Kg	T °C	U litres/Kg	T °C	U litres/Kg	T °C	U litres/Kg
- 10	1,00186	16	1,00103	36	1,00632	80	1,0290
- 5	1.00070	18	1,00138	38	1,00706	85	1,0324
0	1.00013	20	1,00177	40	1,0078	90	1,0359
2	1.00003	22	1,00221	45	1,0099	95	1,0396
4	1.00000	24	1,00268	50	1,0121	100	1,0434
6	1.00003	26	1,00320	55	1,0145	10	1,0515
8	1.00012	28	1,00375	60	1,0171	120	1,0600
10	1.00027	30	1,00435	65	1,0198	130	1,0795
12	1.00048	32	1,00497	70	1,0227	140	1,0795
14	1.00073	34	1,00563	75	1,0258	150	1,0903

TAB. 2A

WORKING PRESSURE	WORKING PRESSURE (BAR) 1	1,5	2	2,5	3	3,5	4	4,5	5
1,5	0,2								
2	0,333	0,167							
2,5	0,429	0,286	0,143						
3	0,5	0,375	0,25	0,125					
3,5	0,556	0,444	0,333	0,222	0,111				
4	0,6	0,5	0,400	0,3	0,2	0,1			
4,5	0,636	0,545	0,455	0,364	0,273	0,182	0,091		
5	0,667	0,583	0,5	0,417	0,333	0,25	0,167	0,083	
5,5	0,692	0,615	0,538	0,462	0,385	0,308	0,231	0,154	0,07
6	0,714	0,643	0,571	0,5	0,429	0,357	0,286	0,21	0,14
6,5	0,733	0,667	0,60	0,533	0,467	0,4	0,333	0,26	0,2
7	0,75	0,688	0,625	0,563	0,5	0,438	0,375	0,31	0,25
7,5	0,765	0,706	0,647	0,588	0,529	0,471	0,412	0,35	0,29
8	0,778	0,722	0,667	0,611	0,556	0,5	0,444	0,38	0,33
8,5	0,789	0,737	0,684	0,632	0,579	0,526	0,474	0,42	0,36
9	0,8	0,75	0,7	0,65	0,6	0,55	0,5	0,45	0,4
9,5	0,81	0,762	0,714	0,667	0,619	0,571	0,524	0,47	0,43
10	0,818	0,773	0,727	0,682	0,636	0,591	0,545	0,5	0,45

TAB. 2B

WORKING PRESSURE	WORKING PRESSURE (BAR)								
	5,5	6	6,5	7	7,5	8	8,5	9	9,5
6	0,07								
6,5	0,13	0,06							
7	0,18	0,12	0,06						
7,5	0,23	0,17	0,11	0,06					
8	0,28	0,22	0,16	0,11	0,06				
8,5	0,31	0,26	0,21	0,16	0,1	0,05			
9	0,35	0,3	0,25	0,21	0,15	0,1	0,05		
9,5	0,38	0,33	0,28	0,24	0,19	0,14	0,01	0,05	
10	0,41	0,36	0,32	0,27	0,23	0,18	0,14	0,09	0,09

TAB. 2

COEFFICIENTS OF THE WATER EXPANSION IN % (WITH OR WITHOUT THE ADDITION OF ANTI-FREEZE GLYCOL)

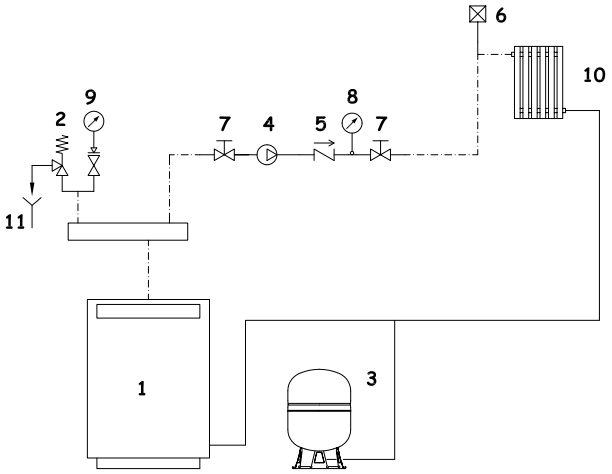
T °C	WATER ONLY	ANTI-FREEZE 10%	ANTI-FREEZE 20%	ANTI-FREEZE 30%	ANTI-FREEZE 40%	ANTI-FREEZE 50%
10	0,04	0,32	0,64	0,96	1,28	1,60
15	0,11	0,43	0,75	1,07	1,39	1,71
20	0,18	0,50	0,82	1,14	1,46	1,78
25	0,31	0,63	0,95	1,27	1,59	1,91
30	0,44	0,76	1,08	1,40	1,72	2,04
35	0,62	0,94	1,26	1,58	1,90	2,22
40	0,79	1,11	1,43	1,75	2,07	2,39
45	1,00	1,32	1,64	1,96	2,28	2,60
50	1,21	1,53	1,85	2,17	2,49	2,81
55	1,46	1,78	2,10	2,42	2,74	3,06
60	1,71	2,03	2,35	2,67	2,99	3,31
65	2,01	2,33	2,65	2,97	3,29	3,61
70	2,28	2,60	2,92	3,24	3,56	3,88
75	2,59	2,91	3,23	3,55	3,87	4,19
80	2,90	3,22	3,54	3,86	4,18	4,50
85	3,21	3,53	3,85	4,17	4,49	4,81
90	3,59	3,91	4,23	4,55	4,87	5,19
95	3,96	4,29	4,61	4,93	5,25	5,57
100	4,35	4,67	4,99	5,31	5,63	5,95

TAB. 3

WATER VOLUME

T °C	DENSITY KG/L.
10	0,99975
15	0,99915
20	0,99820
25	0,99711
30	0,99576
35	0,99421
40	0,99224
45	0,99025
50	0,98807
55	0,98573
60	0,98324
65	0,98059
70	0,98781
75	0,97849
80	0,97183
85	0,96865
90	0,96534
95	0,96192
100	0,95838

EXAMPLE OF INSTALLATION



KEYWORD

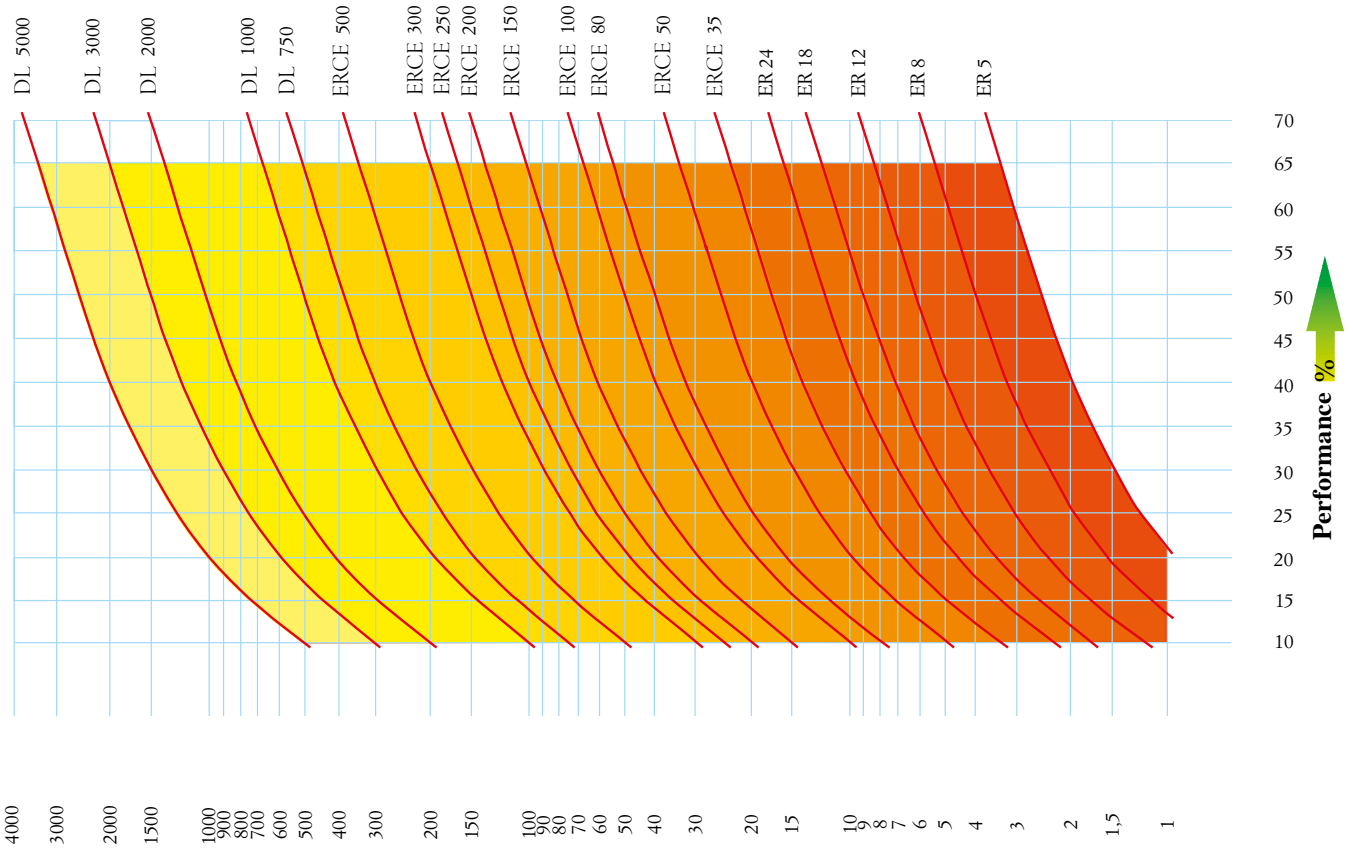
1 - Heat generator
2 - Safety valve
3 - ERCE series expansion tank
4 - Boiler circuit pump
5 - Check valve
6 - Venting valve
7 - Shut-off valve
8 - Thermometer
9 - Gauge
10 - Radiator
11 - Drain

TAB. 4

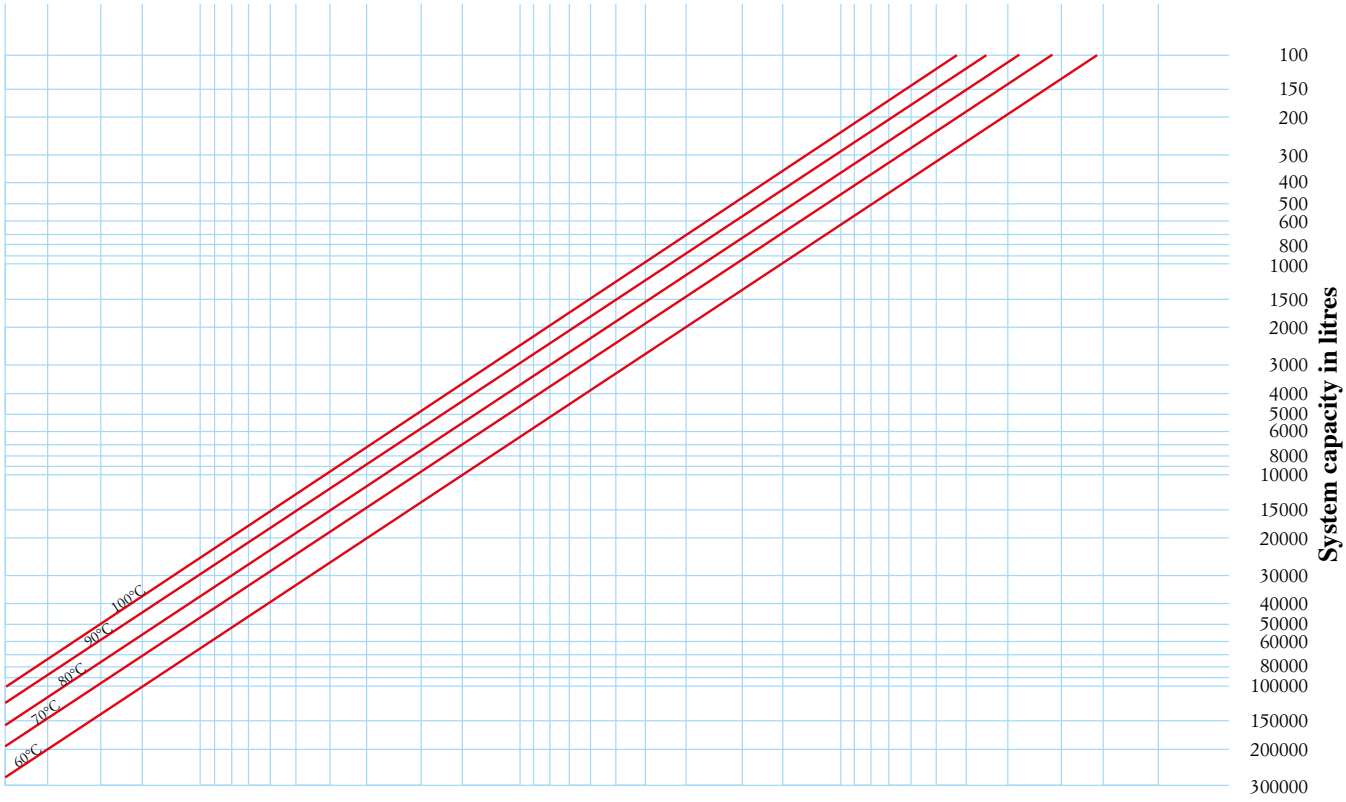
TYPE OF TANK ACCORDING TO THE PLANT'S WATER VOLUME (M3) AND THE MAX. WORKING TEMPERATURE (°C)

DL	Volume m³ 70°C	Volume m³ 80°C	Volume m³ 90°C	Volume m³ 100°C	EXPANSION (litres)
300	11	9	7	6	250
500	19	15	12	10	430
750	28	22	18	15	640
1000	38	30	24	20	850
2000	76	59	48	39	1.700
3000	114	89	72	59	2.550
5000	190	149	118	99	4.250

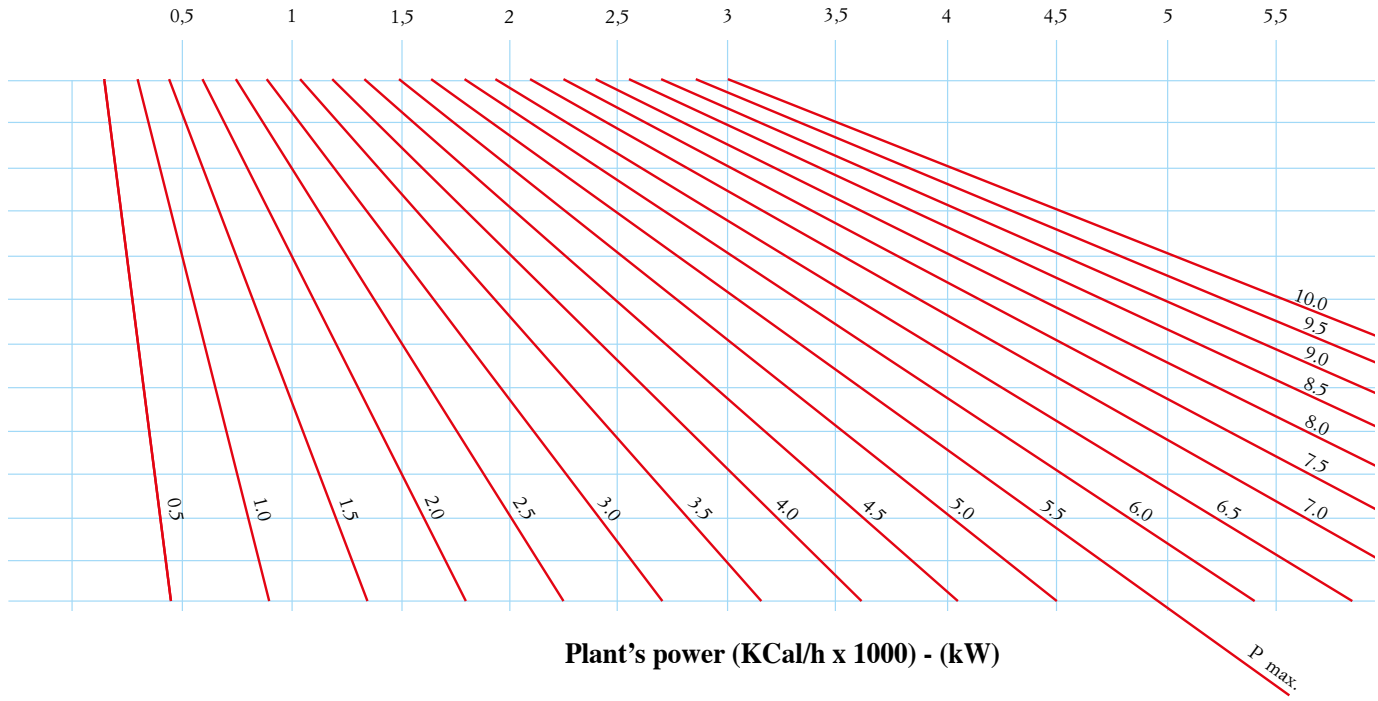
ELBI expansion tanks



Expansion volume in litres

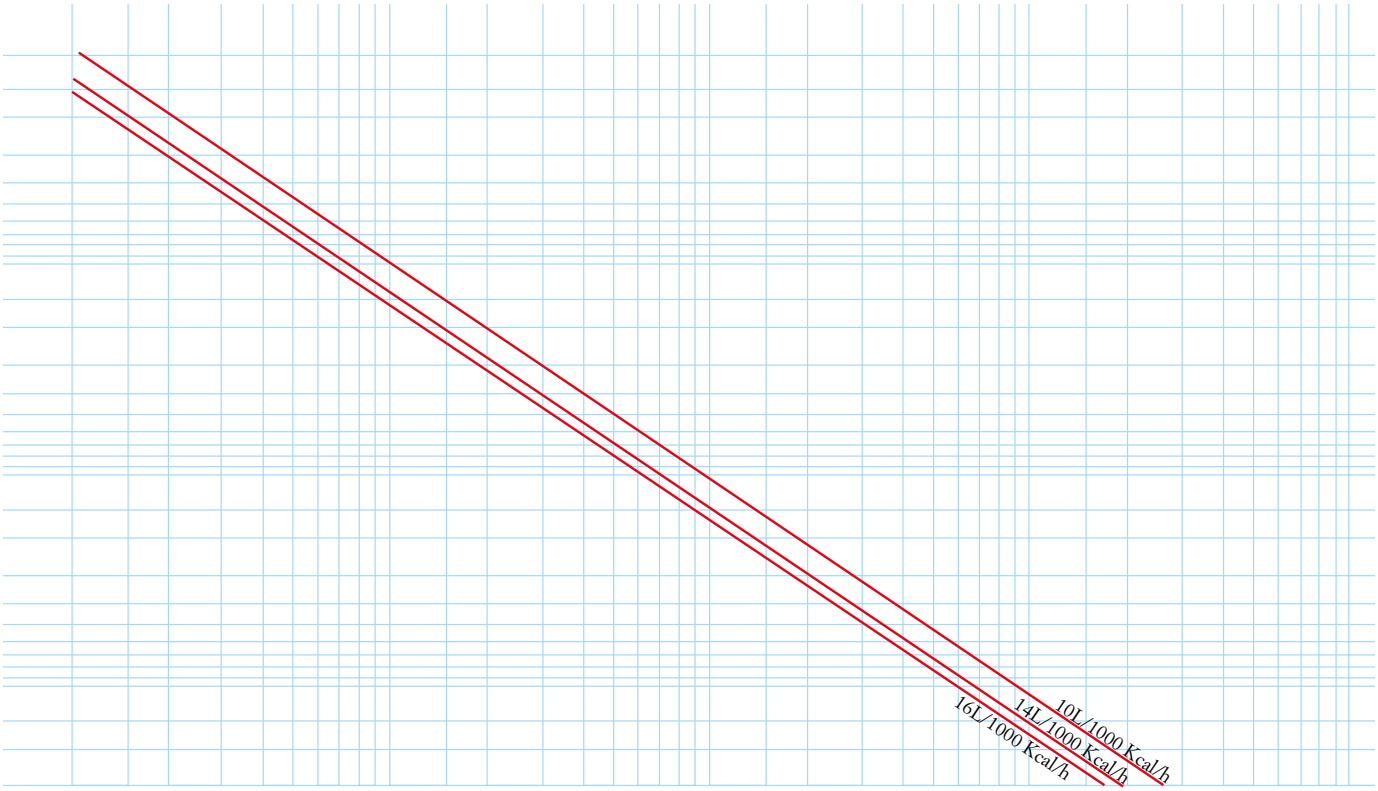


Pre-charge pressure (bar)

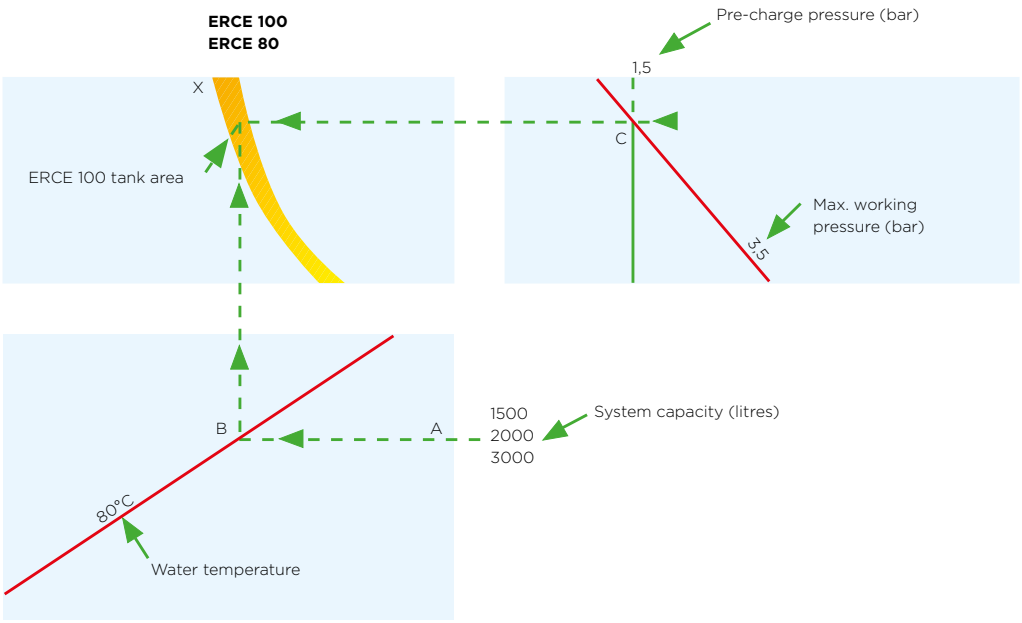


Plant's power (KCal/h x 1000) - (kW)

Kcal/h x 1000	kW
10	11,628
15	17,442
20	23,256
30	34,884
40	46,512
50	58,140
60	69,767
70	81,395
80	93,023
90	104,651
100	116,279
150	174,419
200	232,558
300	348,837
400	465,116
500	581,395
600	697,674
700	813,953
800	930,233
900	1046,512
1000	1162,791
1500	1744,186
2000	2325,581
3000	3488,372
4000	4651,163
5000	5813,953
6000	6976,744
7000	8139,535
8000	9302,326
9000	10465,116
10000	11627,907
15000	17441,860
20000	23255,814
30000	34883,721
40000	46511,628
50000	58139,535
60000	69767,442
70000	81395,349
80000	93023,256
90000	104651,163
100000	104651,163



16L/1000 kcal/h : plant with radiators
14L/1000 kcal/h : plant with convectors (or radiating panels with steel tubes)
10L/1000 kcal/h : plant with radiating panels with copper tubes

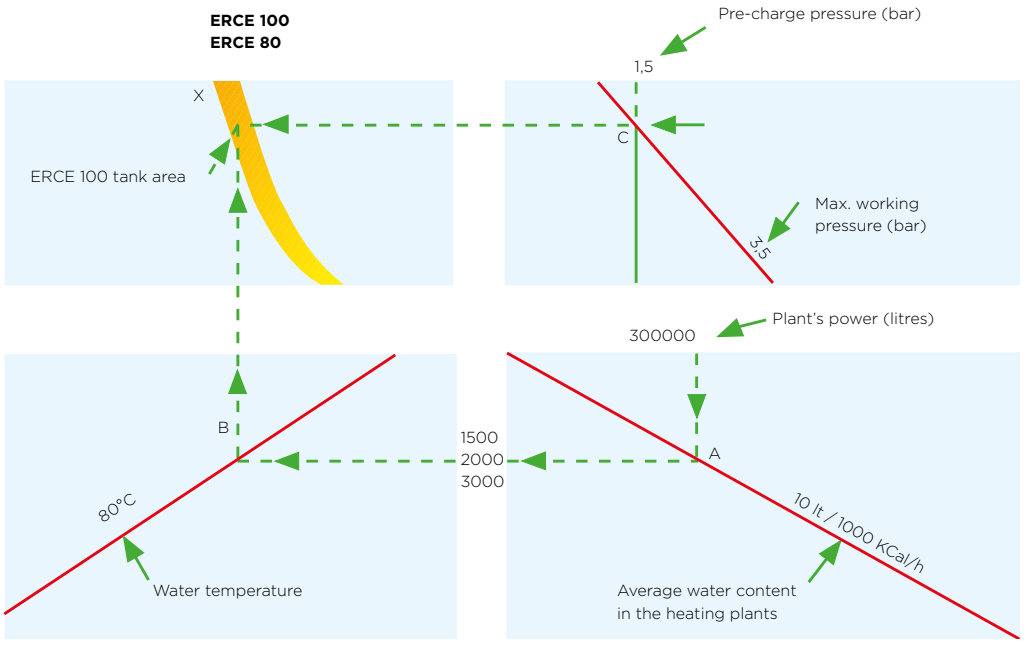


Determination of the expansion tank according to the plant's water content

The initial data used to determine the expansion tank's capacity are the following ones, namely:

- *plant's static pressure or precharge pressure (absolute pressure);*
- *maximum working pressure of the plant (absolute pressure);*
- *water mean temperature;*
- *plant's capacity.*

As you know already the plant's capacity, draw a horizontal line until intersecting the water mean temperature line "A-B". From the point "B", draw a vertical line up to the above graph. Since you know already the precharge pressure and the plant's maximum pressure, it is necessary to find the intersection point of the two right lines "C" and, starting from this one, draw a horizontal line until reaching the graph on the side. In the intersection point of these two right lines "X" you find the expansion tank necessary for the plant.



Determination of the expansion tank according to the plant's power

The initial data used to determine the expansion tank's capacity are the following ones, namely:

- *plant's static pressure or precharge pressure (absolute pressure);*
- *plant's static pressure or precharge pressure (absolute pressure);*
- *maximum working pressure of the plant (absolute pressure);*
- *water mean temperature;*
- *plant's power.*

Since you know already the power, draw a vertical line until intersecting the right line relevant to the mean water content of the plant "A". Starting from the point "A", draw a horizontal line until intersecting the water mean temperature line "AB". From the point "B", draw a vertical line up to the above graph. Since you know already the precharge pressure and the plant's maximum pressure, it is necessary to find the intersection point of the two right lines "C" and, starting from this one, draw a horizontal line until reaching the graph on the side. In the intersection point of these two right lines "X" you find the expansion tank necessary for the plant.