

Technical information

PRESSURE TANKS

CHOOSING AND SIZING THE PRESSURE TANK

The job of the pressure tank, or autoclave, is to limit the number of hourly start-ups of the pumps, supplying the system with a part of its water reserve (which is kept pressurised by the air above).

The pressure tank may be of the air cushion or membrane type. In the membrane version, an elastic membrane inside the tank itself prevents any contact between the air and the water.

In the air cushion version on the other hand, there is no marked separation between the air and the water as parts of each of them tend to mix together, so there is a need for air supply units or a compressor to divide them.

The formula for determining the volume of a pressure tank is as follows:

If we know the maximum intake of the system in litres/min ($A_{\max}$) and the maximum number of pump start-ups permitted in one hour ($N_{\max}$), we can use the table to calculate the necessary tank volume.



$A_{\max}$ (l/min)	System pressure												
	P_{prec}	0.8	0.8	1.8	1.3	1.3	1.8	1.8	2.3	2.3	2.3	2.8	3.8
	P_{min}	1	1	2	1.5	1.5	2	2	2.5	2.5	2.5	3	4
	P_{max}	2	2.5	3	2.5	3	2.5	4	4	4.5	5	5	8
Tank volume [litres]													
10		45	35	60	50	40	100	35	50	40	35	45	30
15		70	60	90	80	60	160	60	80	70	60	70	50
20		100	80	120	110	80	210	80	100	90	70	90	70
30		140	110	180	160	120	310	120	150	130	110	140	100
50		230	180	300	270	200	520	190	250	210	180	220	170
75		350	270	450	400	300	780	280	370	310	270	330	250
100		460	360	590	530	400	1040	370	490	410	350	440	330
150		690	540	890	790	600	1550	560	730	610	530	660	490
200		920	720	1180	1050	800	2070	740	980	810	700	870	650

The formula for making the calculation is: $V = \text{Tank} / \text{tank volume (litres)}$

$A_{\max}$ = maximum system intake (litres/min)

M = Multiplier coefficient (= 16.5 for this calculation model)

P_{min} = Minimum pressure switch setting at which the pump starts up

P_{min} = Maximum pressure switch setting at which the pump stops

$N_{\max}$ = Maximum number of pump start-ups in one hour

P_{prec} = Pre-load pressure

$$\Delta V_t = \frac{[M A_{\max} (P_{\text{max}} + 1) (P_{\text{min}} + 1)]}{[N_{\max} (P_{\text{max}} - P_{\text{min}}) (P_{\text{prec}} + 1)]}$$

All the pressure values are expressed in bars (relative pressure)

When calculating the volume of the tank V_f , the following parameters can be modified: $N_{\max}$, P_{min} , P_{max} , $A_{\max}$.

NB: adjust the tank pre-load at 0.2÷0.3 bar in relation to the pump start-up pressure.