Accumulator Vessels with Replaceable or Fixed Bladders

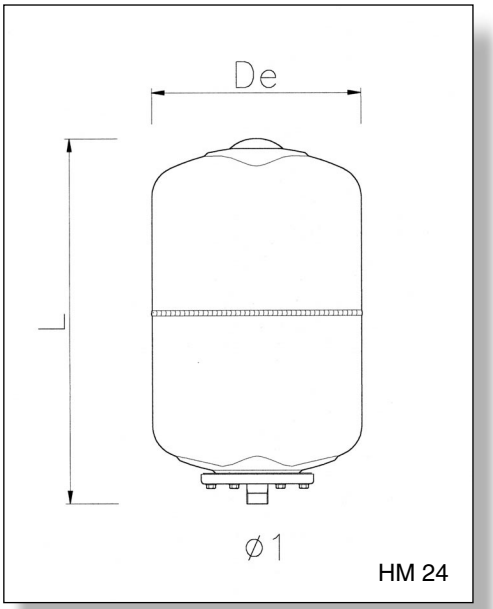
HI-NOX series

from 2 to 60 litres

These stainless alloy expansion vessels represent the top of the Elbi range in terms of quality. Designed as stand-alone units, and not just as a stainless alloy version of the more standard carbon steel products, the HI-NOX expansion vessels are manufactured using all the specific techniques and equipment required of stainless alloy. Special attention has also been paid to the polishing of the products and aesthetic features in general.

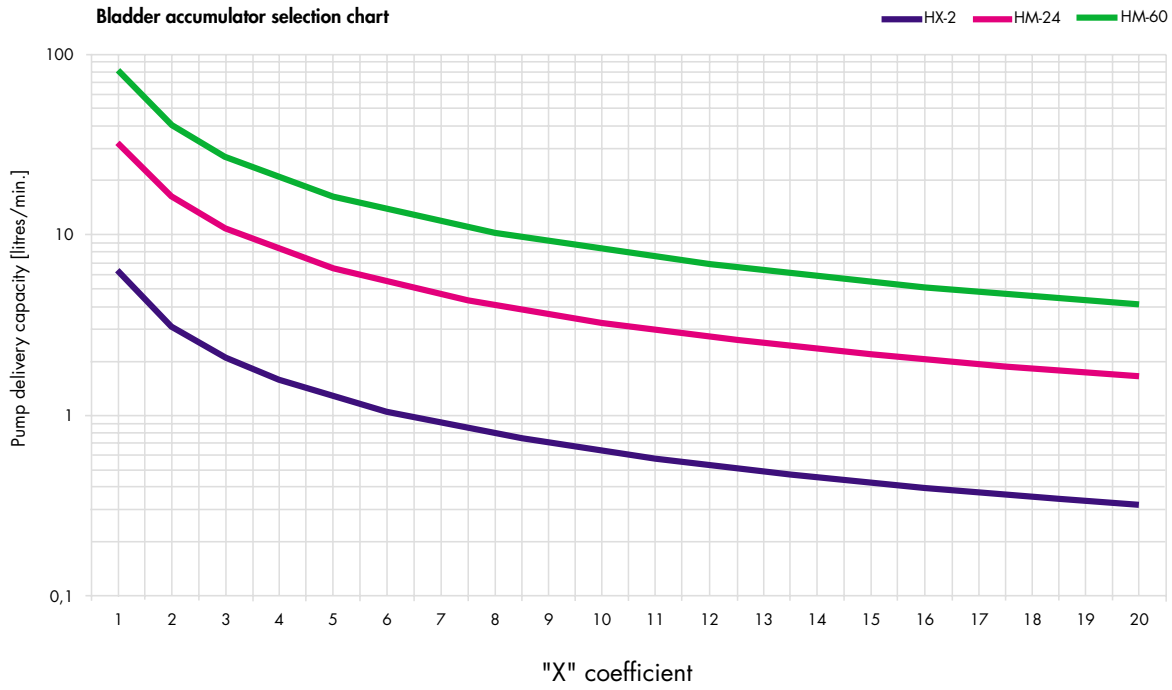
The HI-NOX range comes in different versions in order to meet all the application requirements for that type of products

- The fixed-bladder HX-2 model is particularly suited as a water hammer damper.
- The replaceable bladder HM and HM-GPM models are definitely recommended for small water pressurisation units where the quality and sanitation of water is of paramount importance;
- Similarly in style to the painted steel standard version, the HM-GPM-24 model has been designed to implement smaller, compact-type, water pressurisation units;
- All the HI-NOX series expansion vessels come standard-equipped with EPDM bladders.
- WRc approved.

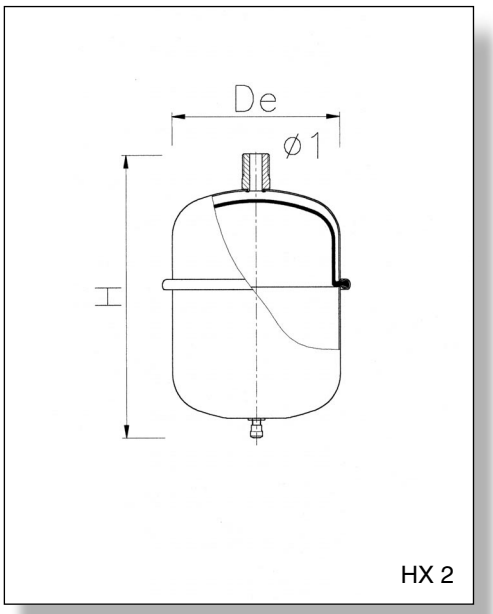


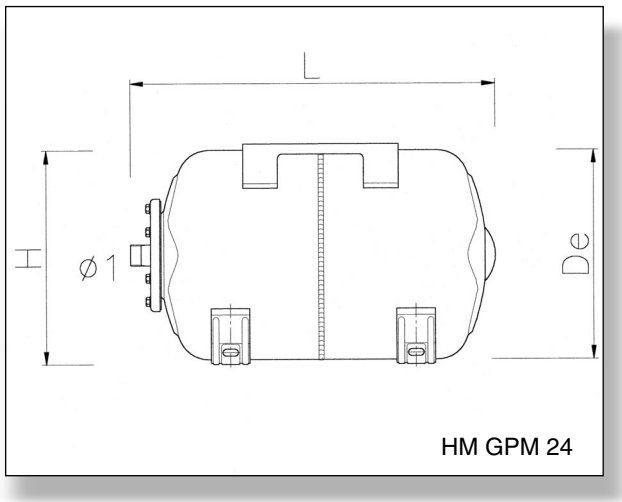
HM 24

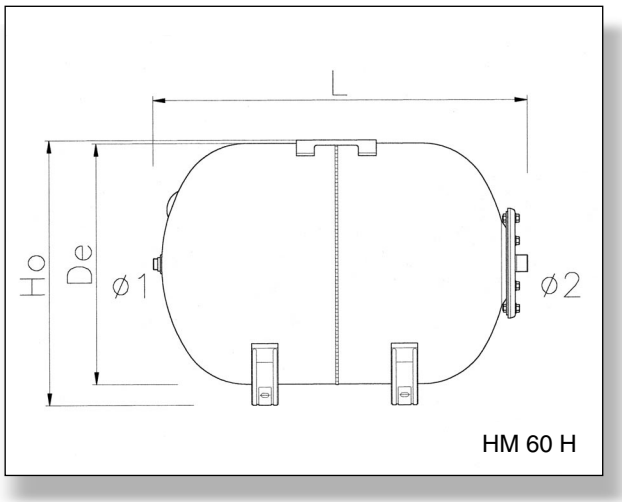
1 MPa = 10 bar

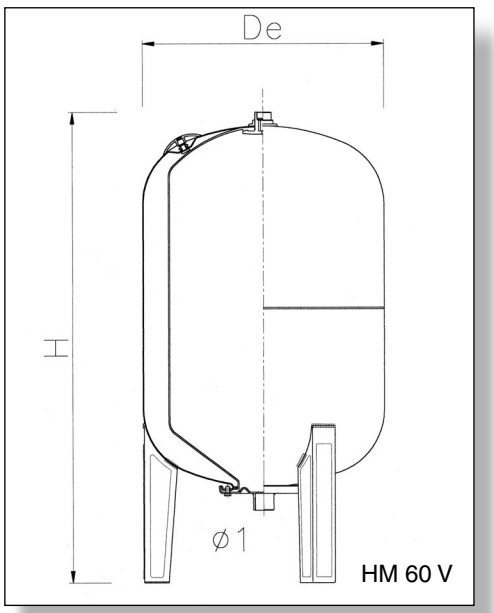


To make sizing easier, a chart has been drawn up to select the most appropriate accumulator according to both working pressure and delivery criteria. Note that the chart is based on the following hypothesis: standard precharge and ***15 pump starts per hour*** *(see p.19 to identify the "X" coefficient).*









How to size bladder-equipped accumulators

General formula to size bladder-equipped accumulators:

$$Vt = 16{,}5 \times \frac{Q_{max}}{A} \times \frac{P_s \times P_a}{P_s - P_a} \times \frac{1}{P_p}$$

Vt = Accumulator global volume *[litres]*
Qmax = Pump max. delivery capacity or system maximum consumption *[lt/min.]*
A = Number of pump starts - stops per hour (12 ÷ 15)
Ps = Pump stop (absolute) pressure *[bar]*
Pa = Pump starting (absolute) pressure *[bar]*
Pp = (absolute) precharge pressure (Pa – 0.5) *[bar]*

The pump may be sized according to two different techniques:

Sizing the accumulator by using the pump maximum delivery capacity

Replace Qmax in the formula by the pump delivery capacity.
The Pa pump starting pressure must be higher than the Pp precharge pressure. In order to optimise the accumulator yielding, the precharge pressure must be 0.5 bars lower than the pump starting pressure.

Sizing the accumulator by using the maximum consumption of the system:

In that case, define the users' maximum consumption by applying the calculation method reported in the UNI 9182 Rec.;
- *Identify users' types (shower, WC, sink, etc.) equipped on the system;*
- *Assess the number of users for each type;*
- *Refer to table 1 for private buildings and to table 2 for public buildings, calculate the number of total system charge units (CU) by multiplying each type of user by the corresponding CU listed in the table;*

Tab 1

PRIVATE BUILDINGS	
USERS	CU
Wash-basin	1
Bidet	1
Bath	2
Shower	2
Toilet bowl	3
Push button urinal	6
Kitchen sink	2
Washing machine	2
Dish washer	2
3/8" hydrant	1
1/2" hydrant	2
3/4" hydrant	3
1" hydrant	6

Tab 2

PUBBLIC BUILDINGS	
USER	CU
Wash-basin	2
Bidet	2
Bath	4
Shower	4
Toilet bowl	5
Push button bowl	10
Kitchen sink	4
Sink	3
Feet wash-basin	2
Drinking fountain	0.75
3/8" hydrant	2
1/2" hydrant	4
3/4" hydrant	6
1" hydrant	10

Once the total charge units have been computed, turn them into litres per minute by referring to table 3.

Tab 3

CONVERSION TABLE (Litres/min.)					
CU	Q [lt/min]	CU	Q [lt/min]	CU	Q [lt/min]
6	18	100	189	1250	930
8	24	120	219	1500	1050
10	30	140	234	1750	1128
12	36	160	255	2000	1230
14	40.8	180	276	2250	1320
16	46.8	200	297	2500	1410
18	51	225	321	2750	1470
20	55.8	250	345	3000	1560
25	67.8	275	366	3500	1680
30	78	300	387	4000	1830
35	87.6	400	468	4500	1950
40	97.2	500	540	5000	2070
50	114	600	600	6000	2280
60	132	700	660	7000	2460
70	144	800	714	8000	2640
80	159	900	774	9000	2820
90	174	1000	828	10000	3000

Once the system maximum consumption (Qmax) has been defined, proceed to size the accumulator by applying the corresponding formula.

"X" coefficent

PUMP STOP PRESSURE (bar) (max)	PUMP STARTING PRESSURE (bar) (min)					
	0.5	1	1.5	2	2,5	3
1	1					
1.5	0.75	3				
2	0.66	2	6			
2.5	0.62	1.66	3.75	10		
3	0.6	1.5	3	6	15	
3.5	0.58	1.4	2.65	4.66	8.75	21
4	0.57	1.33	2.4	4	6.66	12
4.5	0.56	1.28	2.25	3.6	5.62	9
5	0.55	1.25	2.14	3.33	5	7.5
5.5	0.55	1.22	2.06	3.14	4.58	6.6
6	0.54	1.2	2	3	4.28	6
6.5	0.541	1.181	1.95	2.88	4.06	5.57
7	0.538	1.16	1.90	2.8	3.88	5.25
7.5	0.53	1.15	1.87	2.72	3.75	5
8	0.53	1.14	1.84	2.66	3.63	4.8

1 MPa = 10 bar

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