



Pressurisation  
Management

EFD • MAXI • MAXI PLUS



## Introduction



Formed in 1994, Mikrofill Systems Limited based in Worcestershire England developed the unique and patented Sealed System Filling Device, a new concept in the filling and pressure management of unvented heating and chiller systems.

Produced at our factory in Bromsgrove, the electronic version (EFD) along with a comprehensive range of pressurisation equipment is setting new standards in unvented system design.

As an ISO 9001 company, Mikrofill takes pride in the commitment to innovate, design and manufacture quality products backed up with unsurpassed technical and service support.

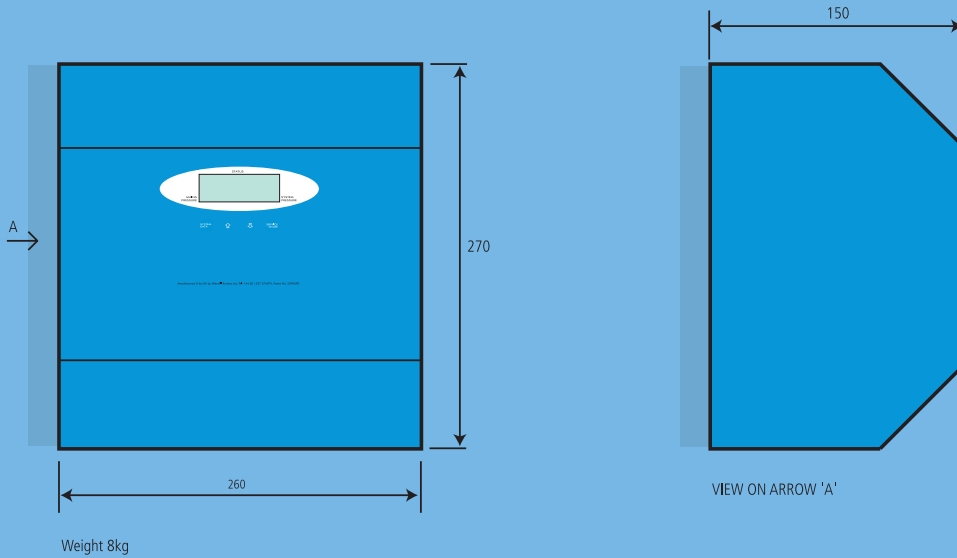
## Introduction to Unvented Systems

Now generally accepted within the building services industry sealed or closed heating and chiller systems eliminate inherent problems associated with conventional open vented design.

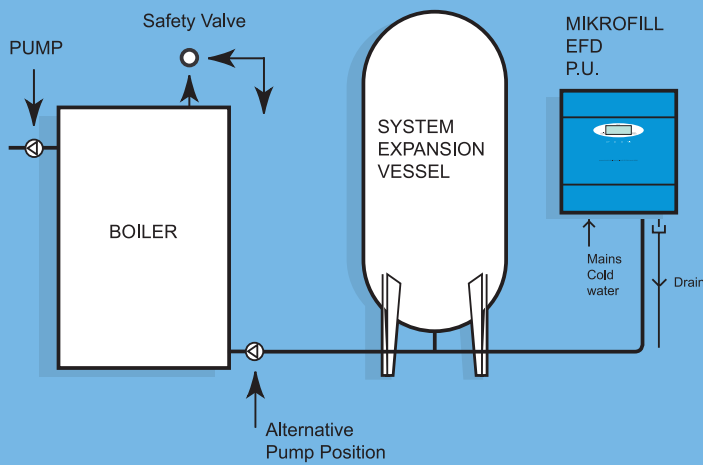
Pumping over or drawing air through the vent pipe is eliminated. Reduction of system corrosion and noise, greater flexibility in system design, no water evaporation and increased pressures and temperatures are just some of the advantages associated with an unvented application.

The Mikrofill range of pressurisation management equipment gives the designer and installer various levels of control with models creating up to five bar in pressure.

## Dimensions



## Typical Installation Diagram



The expansion vessel is usually connected on the inlet side of the pump on the system return, with this arrangement pump pressure is additive and the entire system is above atmospheric pressure. For systems with flow temperatures exceeding 90° contact our technical advice.

## Electronic Filling Device

The Unique Electronic Filling Device (EFD) is the most advanced filling device available. A Pressure Logic™ microprocessor unit controls system pressure via Honeywell transducers with continuous system status indicated on a liquid crystal display. A multi function control panel accesses all control functions.



The WRAS approved EFD fulfils three roles, backflow preventor, filling device and pressurisation manager all within one wall mounted compact unit. It offers designers and installers the flexibility formerly not available from other manufacturers. The EFD is a fully automatic, wall mounted sealed system filling unit for domestic and commercial heating and cooling systems (water risk category 3 & 4).

Unlike conventional pressurisation equipment, the EFD contains no pumps or storage tanks; it utilizes mains cold water to fill and maintain pressure. Backflow prevention is achieved by using a patented principle to generate an air gap between the heating /chiller system and the cold water main.

With a fill rate of 14ltrs/min, the EFD is capable of filling systems from empty, the Pressure Logic™ microprocessor controls all functions of the EFD maintaining system pressure, protecting the system from high or low pressure fault condition, monitors system fill rates, and shuts down upon the development of a major leak.

BMS relays for remote indication of high or low pressure fault and normal run conditions are standard, and the hours run facility allows the user to calculate system content and abnormal water usage.

The EFD is suitable for cold fill pressures within 0.3 bar of the cold water mains pressure and 6 bar when connected to a suitable booster set.

Ease of installation has always been an important feature of all Mikrofill products and the EFD is no exception, it is delivered with full factory commissioning and comes with a Two year parts and labour guarantee. The EFD is the smallest self contained pressurisation management unit available with an unsurpassed level of performance and specification.



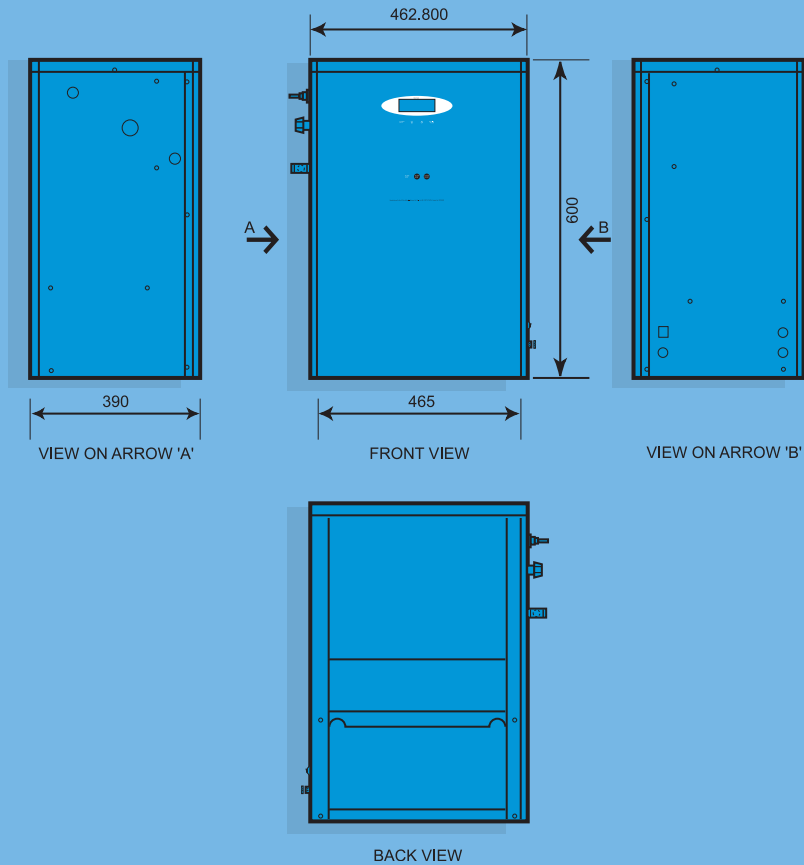
### Control Features:

High pressure alarm	- deactivates boiler / chiller relay - activates BMS relay.
Low pressure alarm	- deactivates boiler / chiller relay - activates BMS relay.
Flood alarm	- actuates system shutdown.
Hours run indication.	
Frequent use alarm.	
Dry run protection.	

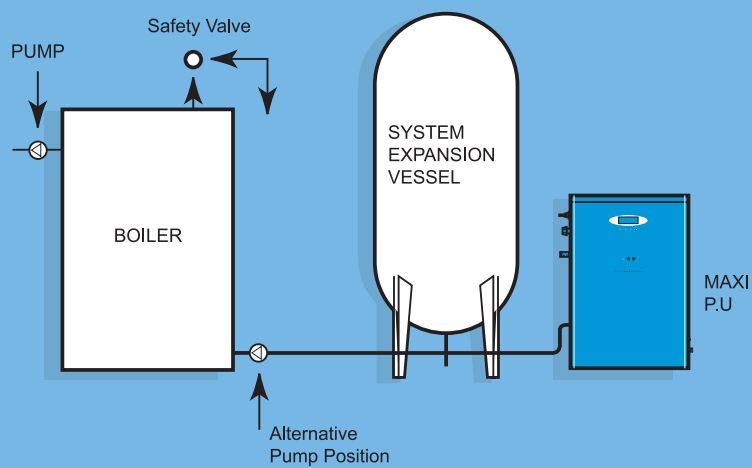
### Benefits:

- Two year parts and labour guarantee
- WRAS approved for connection directly to mains water supply.
- Back flow prevention (up to fluid category four)
- Precise pressure control
- Unique Pressure Logic™ microprocessor with self diagnostic electronics.
- Factory commissioned (no on site commissioning required)
- Unique flood protection (the EFD will not feed a major leak).
- Relay for boiler / chiller control
- Dry run protection
- Fills entire systems from empty (no RPZ or temporary connections required).
- Compact wall mounted design.

## Dimensions



## Typical Installation Diagram



The expansion vessel is usually connected on the inlet side of the pump on the system return, with this arrangement pump pressure is additive and the entire system is above atmospheric pressure. For systems with flow temperatures exceeding 90° contact our technical advice.

## Maxi & Maxi Plus

THE MIKROFILL MAXI range of microprocessor controlled pressurisation units are purpose designed with both the specifier and installer in mind, they feature the very latest in microprocessor technology together with the tried and tested components featured in the original MAXI range.



The MAXI range of pressurisation units represent the ultimate in design, technology, quality and system control, offering benefits unique to the MIKROFILL range of system filling and pressurisation units.

### MODELS:

MIKROFILL MAXI, SINGLE PUMP UNIT.  
MIKROFILL MAXI PLUS, TWIN PUMP UNIT.

The Mikrofill Maxi / Maxi Plus microprocessor controlled single / twin pump pressurisation units are suitable for cold fill pressures up to 3.00 bar (5.00 bar high range unit). Housed in a 1.5mm powder coated "zintec" steel cabinet the Maxi incorporates a 25 litre plastic cold water header tank with a bulkhead mounted class 1 type ball float valve arranged to form a Type AA air gap, a low water level switch is situated in the feed tank.

A peripheral bronze pump / pumps with bronze impellor and nitrile seals are mounted on the chassis; interconnecting pipe work is manufactured using polyethylene pipe and fittings incorporating all check valves and strainers.

A "Pressure logic™" Microprocessor unit controls system pressure via a Honeywell transducer, continuous system status is indicated on the LED readout. The unit incorporates "Flood protection" and offers the following status information:

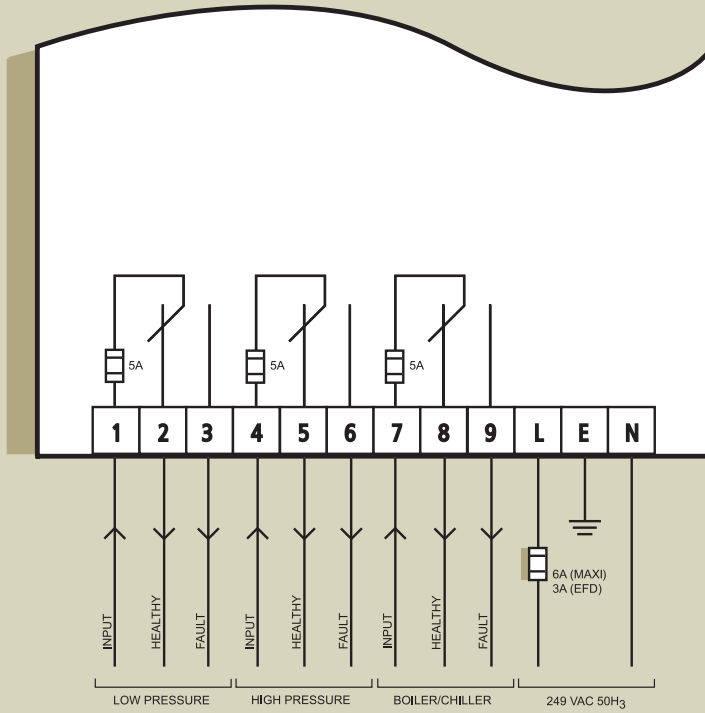
### Benefits:

- TWO YEAR PARTS AND LABOUR GUARANTEE
- PRECISE PRESSURE CONTROL
- UNIQUE "PRESSURE LOGIC™" MICROPROCESSOR, DEVELOPED BY MIKROFILL SYSTEMS LTD
- FACTORY COMMISSIONED (NO SITE COMMISSIONING REQUIRED)
- UNIQUE FLOOD PROTECTION. THE MAXI UNITS WILL NOT "FEED" A MAJOR LEAK.
- BMS RELAYS FOR HIGH AND LOW PRESSURE ALARMS
- BMS RELAYS FOR PUMP FAULT ALARM (MAXI PLUS ONLY)
- RELAY FOR BOILER OR CHILLER CONTROL
- COMPACT DESIGN
- LOW WATER LEVEL CONTROL
- PUMP DRY RUN PROTECTION
- AUTOMATIC PUMP CHANGEOVER (MAXI PLUS ONLY)
- AUTO SEQUENCING OF DUTY PUMP (MAXI PLUS ONLY)
- FULL STATUS INDICATION
- STURDY POWDER COATED STEEL CASING
- HIGH QUALITY BRONZE PERIPHERAL PUMP(S)
- BULKHEAD MOUNTED BALL FLOAT VALVE, WITH TYPE AA AIR GAP AND OFFERING MAXIMUM WATER STORAGE
- INTEGRAL DOUBLE POLE ELECTRICAL ISOLATOR
- SUITABLE FOR COLD FILL PRESSURES UP TO 3.00 Bar (30 metres head)
- HIGH PRESSURE UNITS UP TO 5.00 bar (50 metres head) AVAILABLE
- SUITABLE FOR WALL OR FLOOR MOUNTING
- LOW ELECTRICAL LOADING.
- SELF DIAGNOSTIC ELECTRONICS

- High level alarm setting - deactivates boiler /chiller relay  
- activates BMS relay
- Low level alarm setting - deactivates boiler/ chiller relay  
- activates BMS relay

- Frequent use alarm
- 24 hr usage
- Flood alarm actuating system shutdown
- Pump failure alarm  
(actuates changeover to second pump on MAXI PLUS)
- Second pump failure alarm
- Low water level alarm, deactivates pressurisation pump until water level reinstates

## Electrical Installation



## Alarm Conditions (all units)

### High/Low Pressure (All models):

If for any reason (except when initially filling) the system water pressure falls below or rises above the preset pressure setting, the pressure alarm BMS relay will actuate allowing remote signals to be conveyed to any BMS system. The units LCD will warn of the high or low pressure condition and the boiler/chiller relay will activate to protect the system. On restoration of correct working pressure the system will automatically reset.

### Flood Protection (All models):

If a potential flood condition or excessive water demand was detected the unit would rapidly react, within 20 seconds the Pressure Logic™ controller would shut the system down deactivating the boiler/chiller relay and stopping any filling operation. The system will not automatically reset this would have to be done manually.

### Frequent use (All models):

If the unit detects that the system is frequently demanding water the frequent use alarm will register the condition.

### Low water level (Maxi range):

Should the water level in the feed tank drop below a predetermined level the LCD on the unit will display the condition and the integral pump/pumps will be disabled.

### Dry run protection (Maxi range):

Should the water flow fail the pump/pumps will be deactivated, dry run fault will be displayed on the LCD.

## Additional Notes

The Mikrofill Electronic Filling Device is WRAS approved for filling closed primary heating and cooling circuits in commercial and domestic premises. WRAS certificate number 0201032.

All Mikrofill products should be installed by a competent person with regard to the relevant requirements of the Health and Safety Regulations, Building Regulations, IEE Regulations, Water Supply (Water Fittings) Regulations, Water Byelaws (Scotland) and any local planning requirements.

## Guarantee Terms

The Mikrofill Pressurisation units carry a fully transferable 2 year guarantee against faulty manufacture or materials provided that:

- It has been correctly installed as per the instructions in the instruction manual and all the relevant codes of practice and regulations in force at the time of installation.
- It has not been modified in any way, other than by Mikrofill Systems Ltd.
- It has not been frost damaged.
- It has not been tampered with or been subjected to misuse or neglect.

This guarantee does not affect your statutory rights.

## Electrical Data Maxi/Maxi Plus

Supply: 240V 1ph 6 amp

Full Load current: 2.5 amp

Start current: 4.5 amp

Fuse Rating: 6 amp

BMS relays: Volt free contacts rated at 250V @ 5 amp

Boiler / chiller control relay volt free contact rated at 250V @ 5 amp

All relays are independently fused at 5 amp

## Electrical Data EDF

Supply: 240V 1ph 6 amp

Full Load current: 1 amp

Start current: 1 amp

Fuse Rating: 3 amp

BMS relays: Volt free contacts rated at 250V @ 5 amp

Boiler / chiller control relay volt free contact rated at 250V @ 5 amp

All relays are independently fused at 5 amp





Graph 1  
Calculation of Vessel Factor  
(Worked Example)

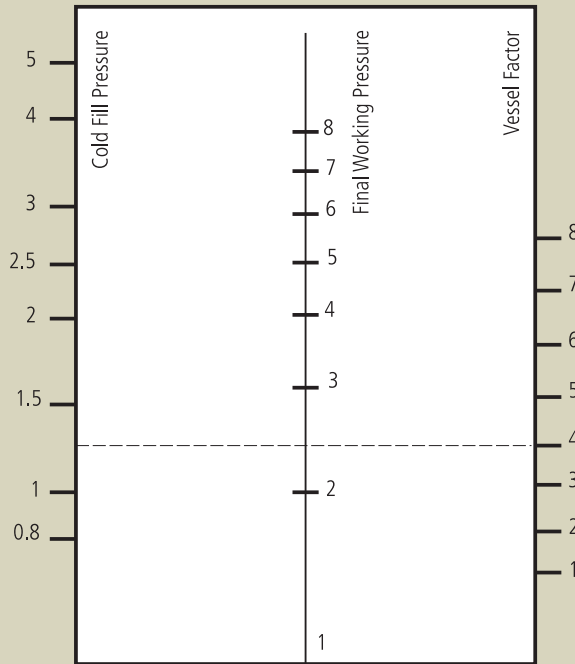


Table 1 - Calculation of System Factor

		Maximum System Temperature C°												
		30	35	45	45	50	55	60	65	70	75	82	85	90
VESSEL FACTOR	8	0.01	0.014	0.018	0.023	0.028	0.033	0.038	0.044	0.052	0.058	0.067	0.072	0.08
	7	0.012	0.016	0.02	0.026	0.031	0.037	0.042	0.05	0.057	0.064	0.073	0.082	0.09
	6	0.014	0.018	0.023	0.029	0.036	0.042	0.05	0.057	0.066	0.074	0.083	0.091	0.103
	5	0.015	0.02	0.027	0.034	0.041	0.05	0.057	0.066	0.077	0.085	0.10	0.108	0.117
	4	0.019	0.025	0.032	0.04	0.05	0.06	0.068	0.079	0.092	0.105	0.12	0.13	0.143
	3	0.023	0.03	0.04	0.05	0.062	0.074	0.085	0.10	0.114	0.13	0.15	0.16	0.18
	2	0.03	0.04	0.054	0.069	0.082	0.10	0.115	0.133	0.155	0.17	0.20	0.22	0.24
	1	0.045	0.06	0.08	0.1	0.125	0.15	0.175	0.20	0.23	0.26	0.30	0.325	0.3675

# Sizing the System Expansion Vessel

Sizing the expansion vessel

## Step 1 - Select the parameters

The following factors affect the vessel selection and the appropriate values should be assigned:

1. Total height of system
2. Flow/return temperature
3. Pressure developed by circulating pump(s)
4. Maximum allowable pressure in system as dictated by components in system (i.e. Radiator, Boilers, Heater Batteries.)
5. Maximum allowable vessel working pressure
6. Maximum allowable vessel acceptance
7. System water content

## Step 2 – Calculate the cold water fill pressure

The cold water fill pressure must be in excess of the static head exerted by the height of the water in the system, above the pressurisation unit.

i.e. 
$$\frac{\text{Height in metres (as in 1)} + 3^*}{10} = \text{Cold Fill Pressure (bar)}$$

\*allow extra 3 metres to assist venting

NB The cold fill pressure is also the air/nitrogen charge pressure in the expansion vessel

Example:

Height of system = 10m then

$$\frac{10 + 3}{10} = 1.3 \text{ bar cold fill pressure and vessel charge pressure}$$

## Step 3 – Calculate the final working pressure

In strict theory the final working pressure would be calculated by assessment of maximum allowable system pressure, as dictated by the components in the system, and their vertical position in the system relative to the expansion vessel.

In practise, normally a final working pressure is selected to give a reasonable vessel factor. This is perfectly acceptable on most systems where the maximum allowable pressure in the system, as dictated by the components is considerably higher than the cold fill pressure i.e. 3 – 4 bar differential.

Example: Maximum allowable pressure in the system = 4 bar. Assume a cold fill pressure as calculated in step 2 = 1.3 bar and a final working pressure of 2.5 bar is selected, then the vessel factor of 4 is interpolated from Graph 1, or if a final working pressure of 2.0 bar is selected, the vessel factor would be 2. (the higher the vessel factor, the smaller the vessel).

We would recommend that if any doubt arises you should contact our technical department, as in certain circumstances the maximum allowable pressure can be quite low, i.e. cast iron pipework systems.

## Step 4 – Calculating the vessel factor

You have now calculated the cold fill pressure and selected the final working pressure. Use these two parameters to arrive at the vessel factor by interpolation from Graph 1.

## Step 5 – Obtaining the system factor

Using the vessel factor, interpolate from Table 1 to find the system factor, the temperature shown as being maximum system temperature.

Please note: for chilled water systems we recommend using 30°C as the maximum system temperature

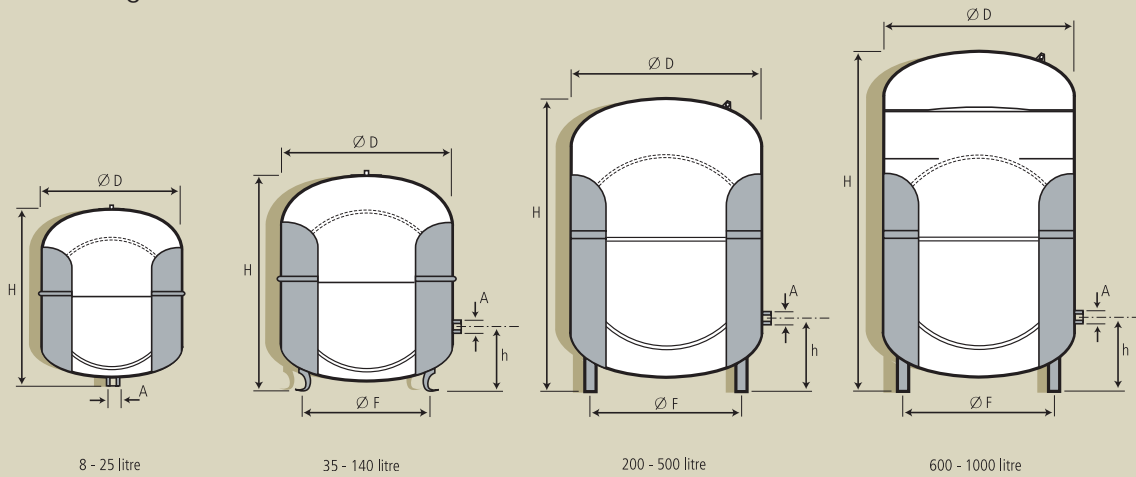
## Step 6 – Calculating the expansion vessel size

Obtain vessel selection by multiplying system water content\*(say in this instance 1200L), x 0.143 = 171.60L

Recommended vessel = 200l with 1.3 bar charge

\* When the water content of the heating or cooling system is not known, then an approximation can be used as follows: Assume 12l of system water content for every 1kW of boiler or chiller power (output) e.g. a heating system with a 100kW boiler can be assumed to have a water content of 1200l (100X12).

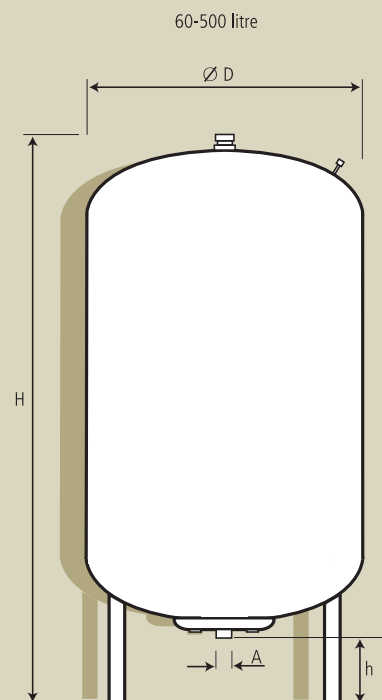
## N Range Technical Data



Model	Ø D	H	h	Ø F	A	Weight
<b>6 bar / 120°C</b>						
N 8/3	272	233			3/4"	1.9
N 12/3	272	315			3/4"	2.6
N 18/3	308	360			3/4"	3.5
N 25/3	308	480			3/4"	4.6
N 35/3	376	465	130	320	3/4"	5.4
N 50/ 6	441	495	175	340	3/4"	12.5
N 80/ 6	512	570	175	370	1"	17.0
N 100/ 6	512	680	175	370	1"	20.5
N 140/ 6	512	890	175	370	1"	28.6
N 200/ 6	634	785	225	485	1"	36.7
N 250/ 6	634	915	225	485	1"	45.0
N 300/ 6	634	1085	225	485	1"	52.0
N 400/ 6	740	1075	225	570	1"	65.0
N 500/ 6	740	1295	225	570	1"	79.0
N 600/ 6	740	1530	245	570	1"	85.0
N 800/ 6	740	1990	245	570	1"	103.0
N 1000/ 6	740	2430	245	570	1"	120.0

## DE Range Technical Data

Model	Ø D	H	h	A	Weight
<b>10 bar / 95°C</b>					
DE 60	409	740	160	1"	25.0
DE 80	480	730	152	1"	27.0
DE 100	480	840	152	1"	32.0
DE 200	634	980	144	1 1/4"	50.0
DE 300	634	1280	144	1 1/4"	55.0
DE 500	740	1485	133	1 1/4"	85.0



## Expansion Vessels

Our range of expansion vessels are now available in 2 formats.

- 10 bar version with removable diaphragm suitable for heating, chilled water and potable water.
- 6 bar version with fixed diaphragm suitable for heating and chilled water.

Designed to absorb volumetric expansion or contraction in heating, domestic hot water and chiller systems.

The range is available in models up to 5000 litres capacity and are protected in a stove enameled powder coating.

All models above 35 litres are supplied with substantial support legs. The 35 litres unit and below are designed for wall mounting.



## N Range

Benefits:

- For heating and chilled water applications
- Threaded connections
- Max. operating temperature 120°C
- Meets or exceeds CE norms for pressure vessels 97/23/EG
- Non-replaceable membrane
- Colour red, durable power coating finish
- Factory pre-set pressure

## DE Range

Benefits:

- For heating, chilled and potable water applications
- Heavy gauge steel RST 37-2
- All vessel parts in contact with water are coated against corrosion
- Replaceable diaphragm
- Max. operating temperature 95°C
- Meets or exceeds CE norms for pressure vessels 97/23/EG
- Factory pre-set pressure
- Colour blue, durable power coating finish



## Also available from Mikrofill



Rapide, high recovery stainless steel cylinders with capacities from 60 – 500 litres.



Ethos domestic boilers.



Commercial cast iron boilers



Ethos compact condensing, combination and system boilers.

For information on any Mikrofill products contact our sales department or visit us at [mikrofill.com](http://mikrofill.com)