



INSPIRED

EFFICIENCY

PRESSURISATION UNITS  
EXPANSION VESSELS

ELECTRONIC FILLING DEVICE (EFD)  
MAXI  
MAXI PLUS  
EXPANSION VESSELS



# INSPIRED | EFFICIENCY

Mikrofill Systems Ltd is a Midlands based British engineering company which specialises in the design and manufacture of high quality products for the commercial heating industry.

Now generally accepted within the building service 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 are 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 pressure.

Renowned for developing innovative products, the company has built its success on quality, reliability and outstanding customer service. The rapidly expanding range of products include, gas fired condensing boilers, hot water generators and pressure management equipment.

The patented Mikrofill Electronic filling device (EFD) is a clear market leader and is the most advanced filling device available, suitable for all applications large or small.

All Mikrofill pressure management units are supplied as matched units together with a suitably sized expansion vessel. These factory tested packages usually require no site commissioning.

With over 60,000 already in use, Mikrofill Pressure management systems are the products of choice throughout the commercial heating industry.



This brochure has been designed to enable you to specify Mikrofill with confidence. If you require any further information see [Mikrofill.com](http://Mikrofill.com) or contact our technical department.

## INTRODUCTION TO SEALED SYSTEMS

In any heating or cooling system where water is the thermal transfer fluid (Hydronic systems) there must be a method of introducing the initial charge of water, subsequent "topping up" as required and also a method of accommodating the volumetric expansion of the water as temperatures within the system varies.

The traditional method was the use of a header tank positioned at the highest point of the system. The fill rate was controlled by gravity and an open vent into the header tank allowed for expansion, such an arrangement was described as, "An open vented system".

Although this system was simple and generally reliable it imposed many restrictions on system design and created problems with corrosion due to continual oxygenation of the system water, resulting in premature failure of components.

It is now accepted that it is best practise to seal the hydronic system, that is to say fill the system with water, seal the system and make allowances for expansion by one of the several means available, the most popular being a suitably sized "expansion vessel". The "topping up" of the system is managed by a pressurisation unit. Sealed systems offer freedom of design, drastically reduce corrosion within a system and allow levels of control and protection not possible with "open vented systems".

Mikrofill manufacture a complete range of sealed system equipment, including the Mikrofill Electronic Filling Device, a patented unit that sets new standards for the control of hydronic systems.

In any new sealed system where the boiler output is 70kw or more it is a requirement that a pressure management system must be installed (BS6644).

## PRESSURE MANAGEMENT PRODUCTS

### Mikrofill Electronic Filling Device

The only WRAS approved product that can fill any system from empty and continuously manage the pressure in that system. The Mikrofill requires no pumps and utilises mains pressure to fill. This patented principle is extremely reliable and consumes less electrical power than any other pressurisation product.

The Pressure logic microprocessor offers many unique features and incorporates two levels of flood protection, full BMS and self diagnostics are standard features.

### Mikrofill Maxi

Single pump pressure manager is a conventional pressurisation unit with a difference, in addition to the control features incorporated in the Pressure logic microprocessor the Maxi range also incorporates low water level alarms, pump test buttons and are factory set as standard.

### Mikrofill Maxi Plus

Twin pump pressure manager, as the Maxi specification but with twin pumps, auto change over on pumps and pump status indication.

High pressure versions are available for all Maxi models.

### Mikrofill Expansion vessels

Including compressor controlled units. All Mikrofill Expansion vessels comply with the pressure vessel directive.



## MIKROFILL MIKROFILL EFD, MAXI AND EXPANSION

# MIKROFILL ELECTRONIC FILLING DEVICE (EFD)

## MIKROFILL ELECTRONIC FILLING DEVICE (EFD)

The Mikrofill EFD is a unique patented product that was invented and developed by Mikrofill and is manufactured in our factory in Worcestershire. The Mikrofill has been continuously developed over the last 14 years and is now the undisputed market leader in pressure management.

Unlike "pump type" pressurisation systems the Mikrofill utilises the power of mains water to fill the system, whilst its patented prevention feature ensures that the mains water is protected against harmful backflow. The Mikrofill is the most complete filling and pressure management unit available.

Not only can it fill any system from empty, it is also a WRAS approved fluid category 4 backflow prevention device, so no "Filling loops" or RPZ valves are required. The Mikrofill also offers the most precise pressure management, whilst consuming minimal electrical energy (less than 30 Watts operational, and 10 Watts at standby).

The units feature the Mikrofill "Pressure logic" microprocessor which offers many benefits including two methods of flood protection, indication of water usage (in litres), hours run, and frequent use. The unit also includes BMS relays for high pressure alarm, low pressure alarm and a common fault alarm, as well as an inbuilt audible sounder.

The compact dimensions, ease of installation, and inherent reliability together with its other unique features combine to make the Mikrofill the pressure manager of choice amongst specifiers and installers alike.

All the Mikrofill pressure management units feature full self testing and diagnostics



# MIKROFILL MAXI AND MAXI PLUS

## THE MIKROFILL MAXI AND MAXI PLUS RANGE OF PRESSURE MANAGEMENT UNITS

The Maxi range of units represent the best of conventional “pump type” pressure management units where every model incorporates “Pressurelogic” microprocessor control including flood protection, bronze pumps, water filters, pump test buttons and self diagnostics. The Maxi Plus range of twin pump units also include auto changeover of duty pump.

The standard units are suitable for system cold fill pressures of up to 2.9 bar, whilst the HP versions can fill to 7 bar.

These sophisticated units have been continuously developed over the last 15 years, and have proven extremely reliable, the integral low water level sensor protects the pumps against damage due to running dry and the robust steel case is both functional and attractive. The microprocessor is door mounted to provide protection and enables easy access to pumps and filters.

The Mikrofill Maxi range shares much of its technology with the highly acclaimed Mikrofill Electronic Filling Device, and as such offers the following benefits,

Two stage flood protection, high pressure alarm, low pressure alarm and common alarm with volt free relays. Low water levels and pump failure will activate the integral audible sounder are all standard features, whilst the LCD displays full status information.

Water usage (in litres), frequency of use, hours run and full self diagnostic information is readily available. The units are supplied fully tested and matched to a suitably sized expansion vessel, ensuring that in most situations the units require no further site setting.



## MIKROFILL N RANGE EXPANSION VESSELS

The Mikrofill N range of expansion vessels are intended for use in sealed systems, heating or chilled water and have been designed to the highest specification and meets or exceeds the requirements of 97/23/EC the CE norm for pressure vessels. The Butyl rubber diaphragm is suitable for working temperatures up to 120deg C, thereby eliminating the need for a "gravity loop" and reducing installation time and cost.

The standard N range of Mikrofill vessels extend to 1000 litres but vessels up to 5000 litres are available to special order.

The Mikrofill DE range of WRAS approved vessels are specifically designed for use with potable water and incorporate a replaceable Butyl rubber diaphragm suitable for operating at 10 bar pressure and up to 90°C.

The Mikromat range of vessels have been designed for special applications where space or very close operating pressures are an issue. These compressor controlled expansion vessels can accommodate almost three times the volumetric expansion of a standard vessel thus drastically reducing the footprint of the vessel, alternatively they can very accurately control the final working pressure on systems where pressure is an issue.

The Mikromat Expansion vessels are available in sizes up to 5000 litres capacity

When supplied as part of any Mikrofill pressure management package the vessel will be set at the correct air charge and will include a service valve which enables the vessel to be drained independently of the system if required.



## WATER REGULATIONS

People used to think about water as an infinite resource. They could use it, abuse it, pollute it and somehow it would clean itself and always be in plentiful supply. The truth is our water supplies have to be carefully managed and protected to ensure we have sufficient supply of clean, healthy, wholesome water.

The Water Fittings Regulations (or Byelaws 2000 in Scotland) are national requirements for the design, installation and maintenance of plumbing systems, water fittings and water-using appliances. Their purpose is to prevent misuse, waste, undue consumption or erroneous measurement of water, and most importantly, to prevent contamination of drinking water. They replace the former Water Byelaws which each water supplier has administered for similar purposes for many years.

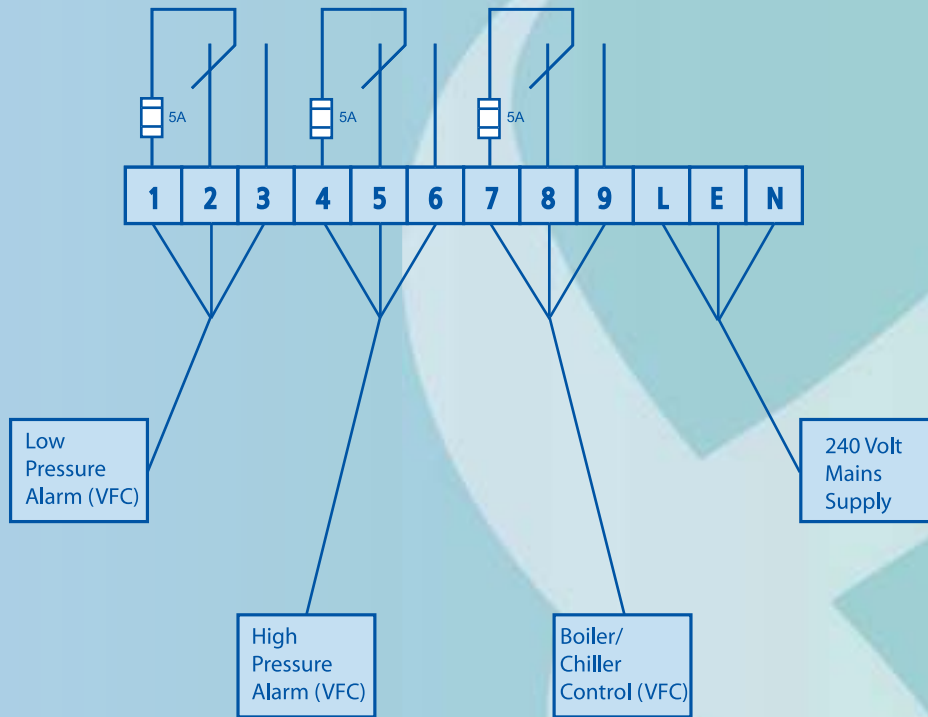
Where water or water-using equipment is used with fluids or materials which could contaminate the wholesome water supply, there must be adequate protection to stop backflow of potentially contaminated water into other parts of the system, especially drinking water. The regulations define Fluid Risk Categories by the type of contaminants which are present and specify the appropriate type of prevention device which must be fitted to guard against backflow.



At Mikrofill we are proud that the level of protection our equipment delivers has set new standards in backflow prevention. Commercial Heating and Chilled water systems are defined as fluid risk category 4 and as such any device that is permanently connected to the wholesome water supply and a heating or chilled water system must provide at a minimum that level of protection.

The Mikrofill Electronic Filling Device (EFD) gives that level of protection, not only does the EFD fill entire systems from empty and manage a designed water pressure, it is the only device of its type to offer fluid risk category 4 backflow prevention built in

**Mikrofill backflow prevention, protecting what is our most precious resource.**



VFC = Volt Free Contacts (max load 5 amp)

## EFD electrical data

- Supply: 230V 1ph 3 Amp
- Full load current: 1 Amp
- Start current: 1 Amp
- Fuse rating: 3 Amp
- BMS relays and boiler/chiller
- Relays: volt free contacts rated at 250VAC at 5 Amp
- All relays are independently fused at 5 Amp

## Maxi electrical data

- Supply: 230V 1ph 6 Amp
- Full load current: 2.5 Amp
- Start current: 4.5 Amp
- Fuse rating: 6 Amp
- BMS relays and boiler/chiller
- Relays: volt free contacts rated at 250VAC at 5 Amp
- All relays are independently fused at 5 Amp

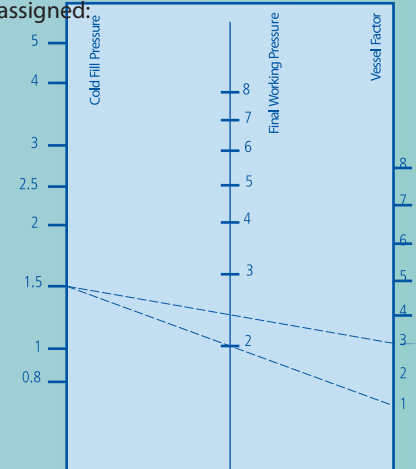


# EXPANSION VESSEL SIZING

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

1. Total height of the system
2. Flow/return temperature
3. Pressure developed by circulating pump(s)
4. Maximum allowable pressure in system as dictated by components in the system (ie radiator, boilers, heater batteries)
5. System water content

Maximum System Temperature													
Vessel Factor	30	35	40	45	50	55	60	65	70	75	82	85	90
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



## STEP ONE

### Calculate the cold water fill pressure

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

ie.  $\text{Height of system in meters} + 3^* = \text{Cold fill pressure (bar)}$  \*allow extra 3 meters to assist venting

10

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

Example: Height of system = 12m then  $12 + 3 = 1.5$  bar cold fill pressure and vessel charge pressure

10

## STEP TWO

### Establish the final working pressure

The final working pressure must always be below the safe working pressure of any components in the system, including the pressure relief valve.

## STEP THREE

### Selecting the vessel factor

Using graph 1 strike a line through the required final working pressure to the right hand side of the graph, read off the vessel factor at this intersection.

## STEP FOUR

### Selecting the system factor

Using the vessel factor obtained from graph 1 and the maximum system temperature, select a system factor from table 1

Example: A vessel factor of 3 and a maximum temperature of 82°C will give a system factor of 0.15.

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

## STEP FOUR

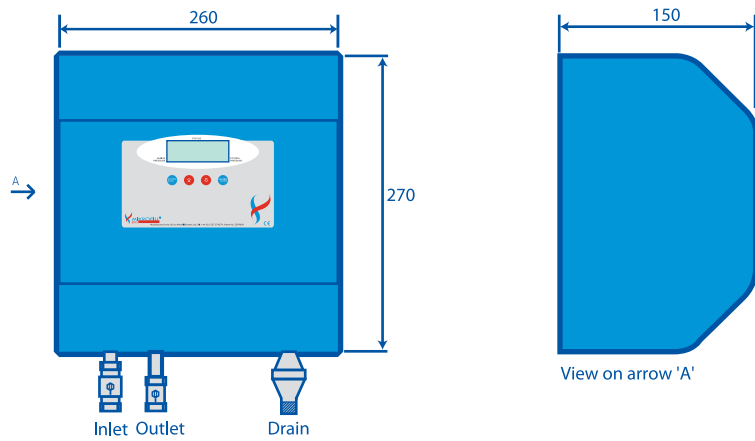
### Calculating the expansion vessel size

Multiplying the system water content by the system factor will result in the minimum expansion vessel size required. In most instances the actual water content of the system is impossible to ascertain and the following approximation based on kilowatt rating of the system is acceptable.

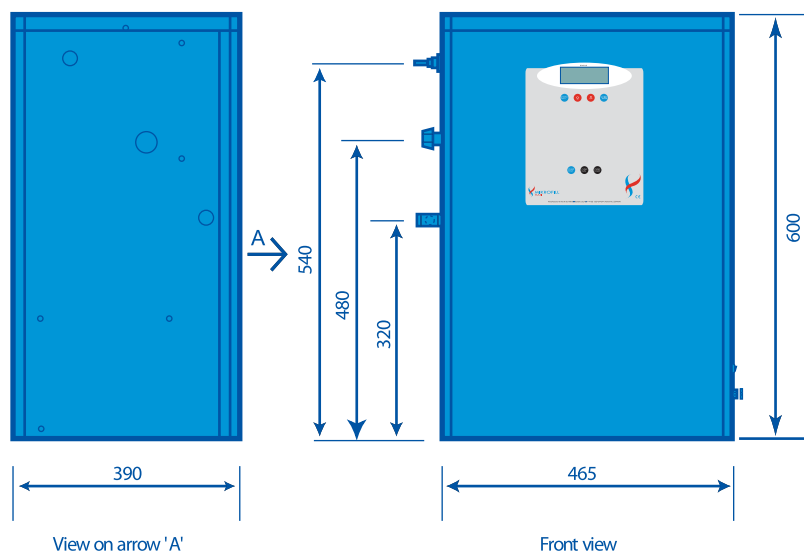
Large Systems	12ltrs/kW
Medium Systems	10ltrs/kW
Small/chilled water systems	8ltrs/kW

# DIMENSIONS

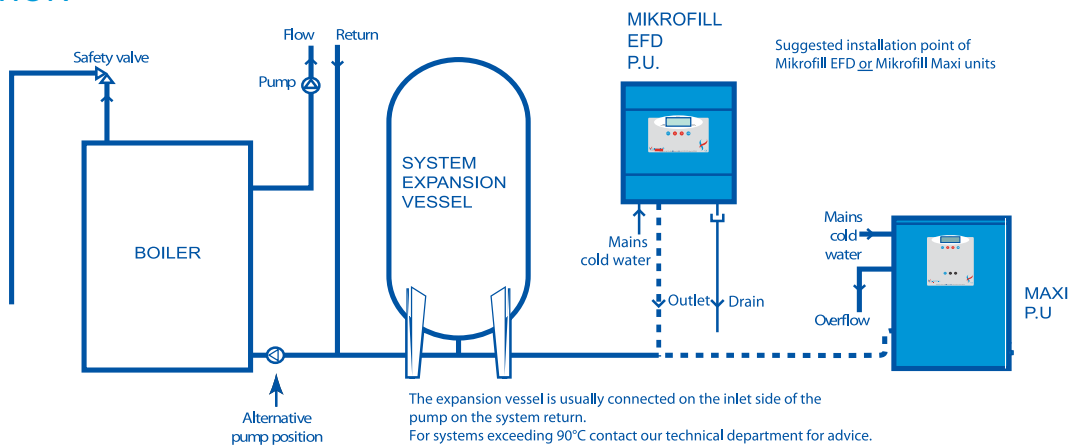
## EFD



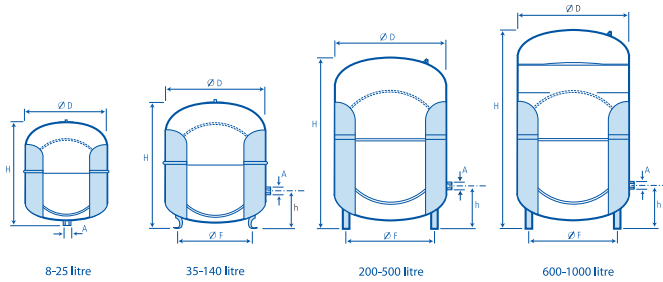
## MAXI & MAXI PLUS



## APPLICATION



## N RANGE EXPANSION VESSELS



## N Range Technical Data

Model	Ø D	H	h	Ø F	A	Weight
3 bar / 120°C						
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
6 bar / 120°C						
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

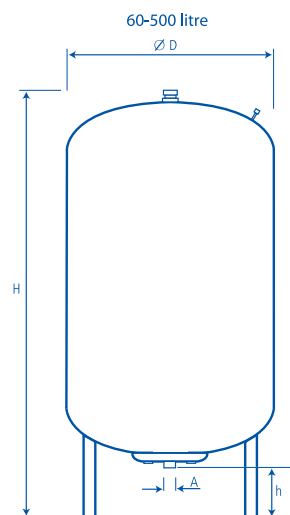
## RELAX, LET MIKROFILL HANDLE THE PRESSURE

At Mikrofill we believe that the process of product selection be as straight forward as possible.

Pressurisation systems can be supplied as complete packages. The pressurisation unit, expansion vessel(s) and service valve\* can be manufactured, tested and set to your specific system requirements, giving the peace of mind that factory matched equipment only can.

\*Mikrofill service valves are the convenient answer to vessel associated maintenance tasks. The all in one service valve allows lockable vessel isolation, (inline with BS6644) drain point and a union connection for quick removal and reconnection. A suitable sized valve is included for each vessel at no additional cost with every packaged unit supplied.

## DE RANGE



## DE Range Technical Data

Model	Ø D	H	h	A	Weight
10 bar / 95°C					
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



# Nemko

MIKROFILL SYSTEMS LTD  
WEST COURT  
MERSE ROAD  
NORTH MOONS MOAT  
REDDITCH  
WORCESTERSHIRE  
B98 9HL

T: +44 (0)8452 60 60 20

F: +44 (0)8452 60 60 21

E: [info@mikrofill.com](mailto:info@mikrofill.com)

W: [www.mikrofill.com](http://www.mikrofill.com)



MFS/PM1008