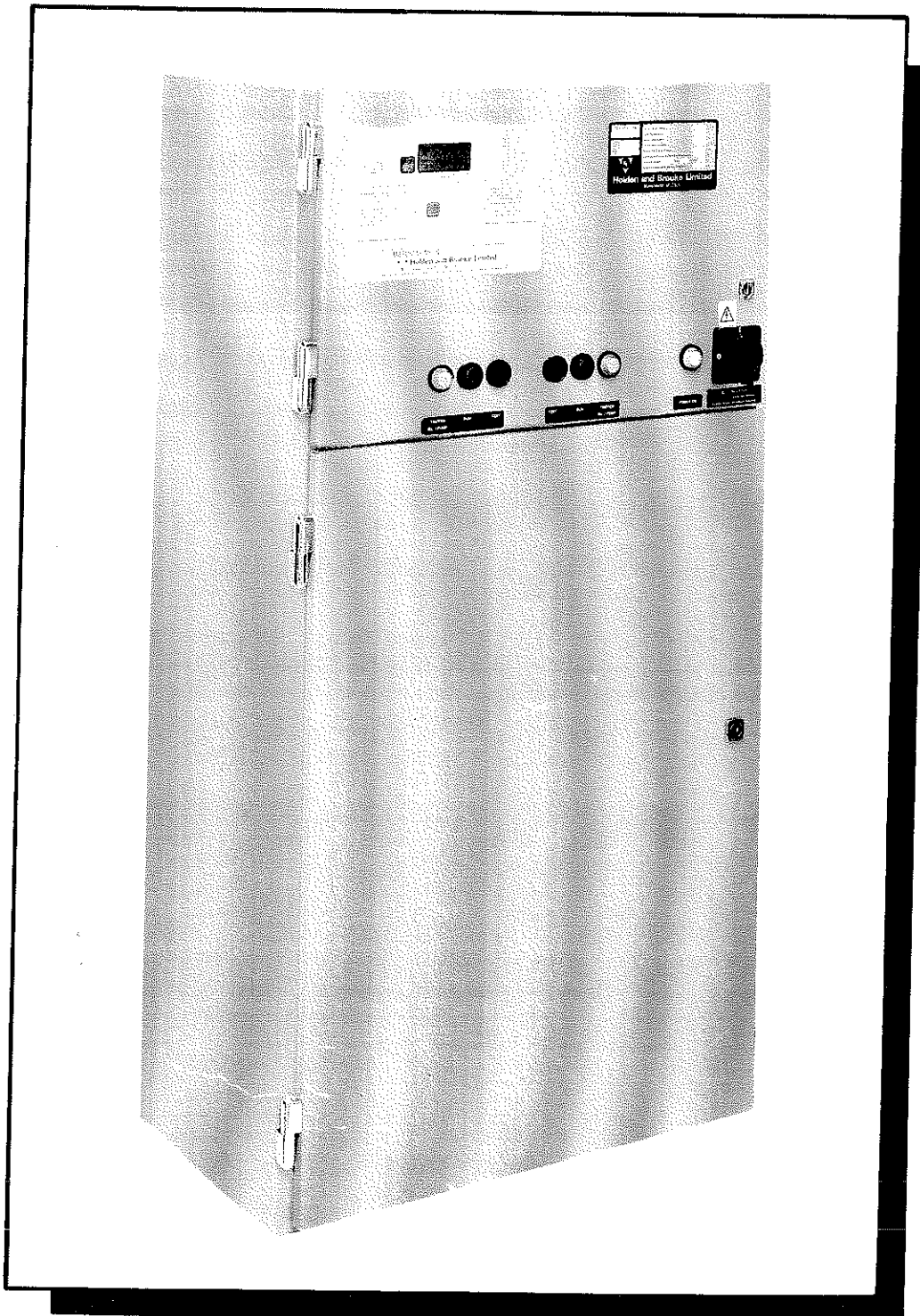


Microstar Pressmatic MKII



Single And Dual – Sealed System Pressurisation Sets For
L.P.H.W./M.P.H.W. And Chilled Water Duties



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INTRODUCTION

The Microstar Pressmatic MKIII is an improved concept in sealed system pressurisation based on control by the Microstar programmable control unit. Microstar being a second generation microprocessor offers a totally reliable and straightforward solution to all pressurisation/make up requirements. Equally at home with L.P.H.W/ M.P.H.W and chilled water systems the fast response to pressure fluctuations offers advantages over the more conventional pressure switch controlled sets. The Microstar Pressmatic MKIII has been designed to meet the requirements of Water Research Centres "Water Supply Byelaws 1989 Edition" in it's standard format. Compliance with Health and Safety Executive guidance note PM5 part C is also catered for by the standard set.

Models are available to cover all aspects of M and E3, 1986 edition, Health and Safety PM5 section B and BS6644 section 11.

A feature of the Microstar Pressmatic MKIII is that site reprogramming of the microprocessor is possible.

CONNECTION REQUIREMENTS

Sizing calculations for the expansion vessels are always based on the set being connected to the return side of the boiler and suction side of the circulating pumps at the neutral point. If it is required to connect at any other point, we should be notified so that account be taken of the residual circulating pump pressure and flow temperatures at that point. The connecting pipe to the system should be sized to give a total resistance under 0.14 bar. The flow rate is calculated as follows:-

$$\text{Flow Rate (m}^3\text{/hr)} = \text{Boiler Rating} \times Y$$

where Y is obtained from Table 1.

Now with a known system connection length the correct size of pipe can be selected from Table 2. for the calculated flow rate.

APPLICATION

Can be used on any system within the specification limits and can also be used to control two systems if required, e.g. heating and chilled water, with either single or duplicate pumps.

INSTALLATION

Normally sets are supplied with the expansion vessels loose for floor or wall mounting except the 18 litre vessel(s) which are mounted on the set.

EXPANSION VESSELS

Sizes 18,60,100,200,300,500 and 1000, litre capacities can be combined to give the required volume. All vessels are the water in the bag type, dry air being the only contact medium within the steel shell. Larger single vessel systems can be supplied, details on request.

FILL PRESSURE from 0.5 bar(7.4psi) to 6.0bar(87psi) single system set dependent on pump size.

MAXIMUM SYSTEM FLOW TEMPERATURE 120°C

SYSTEM CONNECTION(S) 1/2" BSP Female

***WATER SUPPLY CONNECTION** 1/2" BSP Male (Water supply pressure 0.8bar minimum).

***OVERFLOW CONNECTION** to suit 3/4" N.B plastic pipe.

ELECTRICAL SUPPLY 240/220/110 volt, 1ph, 50/60Hz.

FUSE RATING 7 amp.

MOTOR POWER 0.30kW or 0.37kW.

DIMENSIONS 1155mm ht. x 592mm wide x 345mm deep.

WEIGHT 100kg empty, 130kg full. (two pumps)

*These connections meet WRC requirements.

STANDARD FEATURES

Test button(s), door interlocked isolator, alternate pump starting on the two pump sets along with high pressure alarm and low pressure danger alarm(manual reset), and low pressure warning alarm(auto reset) are fitted as standard. A transducer/cable fault alarm and volt free contacts for the following conditions are also fitted as standard equipment :- Common system alarm and system OK status achieved by utilising a changeover contact, high pressure alarm, low pressure warning alarm and low pressure danger alarm. Breaktank arranged with type "A" airgap.

OPTIONAL EXTRAS

Break tank low water level warning(auto reset) and danger(manual reset) alarms, pump start frequency/leakage detector, hours run meter(s), motor starter(s), complete with run and trip lamps, pump suction strainer(s), pump suction isolating valves, safety valve(s) and pressure transducer isolating valve. Volt free contacts for the following conditions are also fitted as optional extras :- No.1 pump run and trip, No.2 pump run and trip, low water level warning and danger alarms and pump start frequency.

COMPATABILITY WITH ENERGY MANAGEMENT SYSTEMS

Separation of volt free alarm signals so that the full range of alarm conditions can now be individually indicated remotely at the Energy Management Systems control centre. A computer serial link facility can also be added by utilising a piggyback board which is coupled to the main Microstar MKIII Controller. The serial link uses RS 422 protocol to allow system parameters and conditions such as exact system pressure, as well as set status to be accessed and displayed at EMS control centre at any time. The serial link has been designed in such a way that most EMS suppliers equipment should be capable of being programmed to allow a full set to control centre interface. We believe this optional extra feature to be unique to the Microstar.

SAFETY FEATURES

The Microstar Pressmatic MKIII Set will visually and audibly indicate alarm conditions and the common system alarm, which should be wired to the boiler and circulating pump control relays is arranged to give "Failsafe" operation. The set has standard/optional indication of the following system conditions or system malfunctions. Items marked thus* are optional.

SYSTEM SETTING

- 1.SYSTEM PRESSURE
- 2.HIGH PRESSURE SETTING
- 3.LOW PRESSURE WARNING
- 4.LOW PRESSURE DANGER
- 5.MINIMUM RUN TIME
- 6.DELAY BETWEEN PUMP STARTS
- 7.STAR RUN TIME
- 8.DELAY

ALARM SETTING

- | | |
|------|-------------------------------------|
| bar | A.PROGRAMME ERROR |
| bar | 1.PUMP No.1 TRIPPED OR ON TEST |
| bar | 2.PUMP No.2 TRIPPED OR ON TEST |
| bar | 3.PUMP No.3 TRIPPED OR ON TEST(N/A) |
| secs | 4.HIGH PRESSURE |
| secs | 5.LOW PRESSURE WARNING |
| secs | 6.LOW PRESSURE DANGER |
| secs | * 7.LOW WATER LEVEL WARNING |
| | * 8.LOW WATER LEVEL DANGER |
| | 9.PUMP START FREQUENCY |
| | 0.INTERNAL PROCESSOR FAULT |
| | *11.HIGH TEMPERATURE |
| | 12.HIGH WATER LEVEL(N/A) |
| | 13.TRANDUCER/CABLE FAULT |

BENEFITS OVER PRESSURE SWITCH CONTROLLED SYSTEMS

1. Fast response to system variations.
2. Increased reliability and set efficiency.
3. Capability of operation on 110v electrical supply.
4. Compatible with energy management systems to indicate system malfunction or run and trip to control console.

ANTI-GRAVITY VESSELS

On systems with the return temperatures above 100°C anti-gravity vessels will be supplied in order to prevent damage to the expansion vessel bags. Situated between the set and the system connection the vessels are vertical steel fabrications which can be black steel or galvanised finish.

INFORMATION REQUIRED TO SIZE THE SET

IMPORTANT NOTE:-

The Microstar Pressmatic MKIII sets can have different initial system pressures on dual sets, therefore size each system individually using each systems own static head figure.

1. Static head from the highest point in system to position of set in metres.
2. System flow temperature in °C.
3. System return temperature in °C.
4. Total water content of system in litres. N.B.If at estimating stage this is not known allow 12 litres/kw boiler/chiller power. At order stage the actual content must be known.
5. Total boiler/chiller power rating in kw.
6. Maximum system working pressure(bar). Where part of the system is below the Microstar Pressmatic Set the static head of that part of the system will require to be deducted from the maximum system working pressure absolute when calculating the vessel acceptance factor.
7. Electrical supply.
8. Note:- The set will be designed for connection to the system on the return side of the boiler and on the suction side of the circulating pumps at the neutral point. If it is required to connect at any other point account will have to be taken of the residual circulating pump pressure and flow temperature at that point.

METHOD OF SIZING THE VESSEL

NOTE: - Where Glycol is present in the system we must be made aware of the percentage at the quotation stage to ensure use of correct Coefficient of Expansion factor.

$$\text{Minimum Vessel Size} = \frac{(\text{System Water Content} + 10\%) \times \text{Coefficient of Expansion}}{\text{Vessel Acceptance Factor}}$$

This abbreviates to :- $\frac{\text{F.S.W.C.} \times \text{C.E.}}{\text{V.A.F.}}$

F.S.W.C. is obtained from item 4. in previous section.

C.E. is obtained from graph fig.3. using the mean temperature of item 2 and 3 in previous section. V.A.F. is derived from Boyles Law and = $\frac{\text{Maximum system working pressure(absolute)} - \text{Initial system pressure(absolute)}}{\text{Maximum system working pressure(absolute)}}$ i.e. $\text{V.A.F.} = \frac{\text{M.S.W.P. (abs.)} - \text{I.S.P. (Abs.)}}{\text{M.S.W.P. (abs.)}}$

and M.S.W.P.(abs.) is obtained by adding 1 bar to pressure shown in item 6 in previous section.

For boiler flow temperatures up to 100°C I.S.P.(abs) = Total Static Pressure in bar from item 1 in previous section + 1bar + 0.2bar.

For boiler flow temperatures above 100°C I.S.P.(abs) = Total Static Pressure in bar from item 1 in previous section + Anti-Flash and Vapour Pressure Margin from graph fig.2. Use system flow temperature to find anti-flash and vapour pressure.

The vessel selected will be the next size up to the calculated minimum requirement.

Note:-V.A.F. must not exceed 0.7. If the calculation produces a figure of higher value than this then use 0.7.

PUMP SELECTION PROCEDURES

PUMP SELECTION: For this we need to know the the pump head which = ISP (initial system pressure), this has already been calculated when sizing the vessels. Secondly the flow rate needs to be calculated as follows, Flow Rate = Boiler Rating (kW) x Y. Where Y is obtained from Table 1. using system flow temperature. Using FR and ISP select pump(s) to be used from Chart Fig.1.

SAFETY VALVE SELECTION

Using the FR and ISP use Chart Fig.1, to select the correct size of valve. Valve to be set at maximum system working pressure(MWP).

IMPORTANT NOTE:-When different size relief valves are selected on dual system sets use the largest relief valve for both systems.

ANTI-GRAVITY VESSEL

On systems with the return temperatures above 100°C an anti-gravity tank should be fitted. The volume is calculated as follows.

Anti-gravity tank minimum size = (System Water Content + 10%) x (Coefficient of Expansion taken from graph fig.3. using the mean flow/return temperature)-0.044.

VESSELS FOR HOT WATER SERVICE APPLICATIONS UP TO 95°C

Water in the bag type vessels are ideal for this application. The method of sizing the vessel is as previously described. The maximum operating temperature of the calorifier being substituted for the mean temperature and the shut valve head of the booster set gives the initial pressure.

The vessel should preferably be connected on the cold water side of the calorifier and non-return valve should be fitted into the main after the booster set and before the connection point for the vessel

WARNING

Under no circumstances should water treatment be introduced into the system via the break tank.No part of the set, connecting pipe or expansion vessel is to be lagged in any way.

Table 1. Flow Temp. Temp/Power Factor

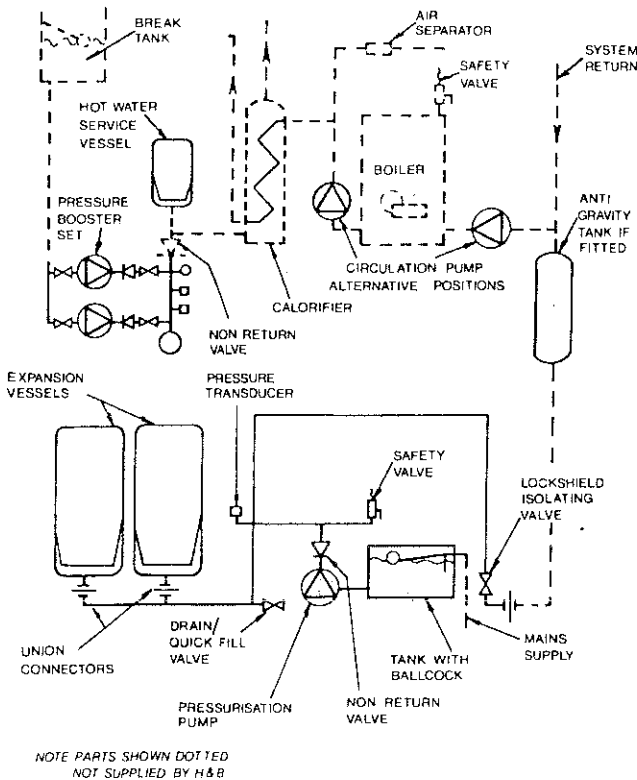
| °C | Y |
|-----|--------|
| 20 | .00012 |
| 25 | .00015 |
| 30 | .00018 |
| 35 | .00023 |
| 38 | .00027 |
| 60 | .00036 |
| 80 | .00046 |
| 82 | .00050 |
| 85 | .00057 |
| 90 | .00060 |
| 95 | .00063 |
| 100 | .00066 |
| 105 | .00066 |
| 110 | .00072 |
| 115 | .00081 |
| 120 | .00094 |

Table 2. FLOW RESISTANCE IN bar/m FOR STEEL PIPE

| FLOW RATE F. R. m ³ /h | PIPE SIZE N/bore IN mm | | | |
|--------------------------------------|------------------------|------|------|------|
| | 12 | 20 | 25 | 32 |
| 0.5 | .005 | .002 | — | — |
| 1.0 | .022 | .007 | .001 | — |
| 1.5 | .043 | .013 | .004 | — |
| 2.0 | — | .020 | .007 | .002 |

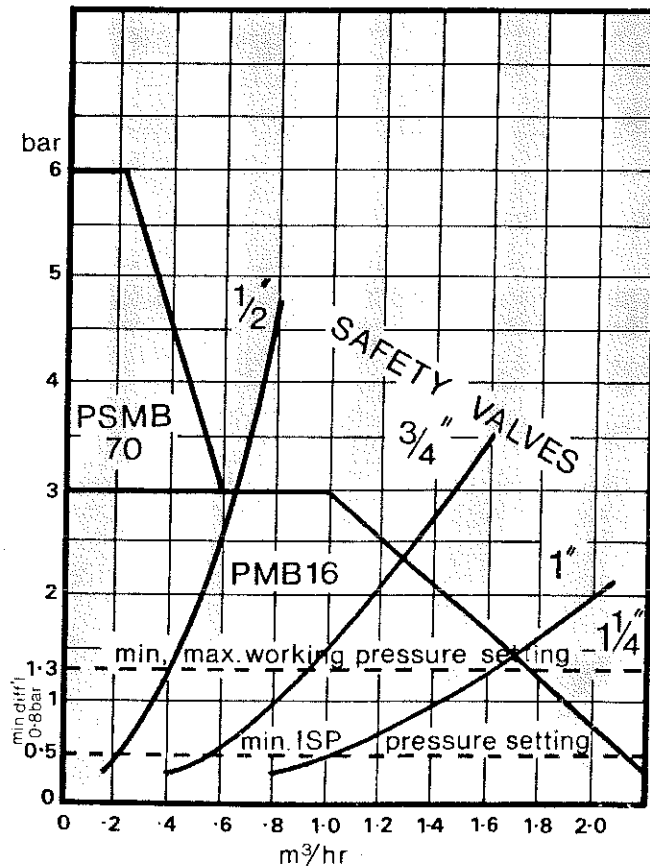
FLOW RATE = BOILER RATING x Y = m³/h

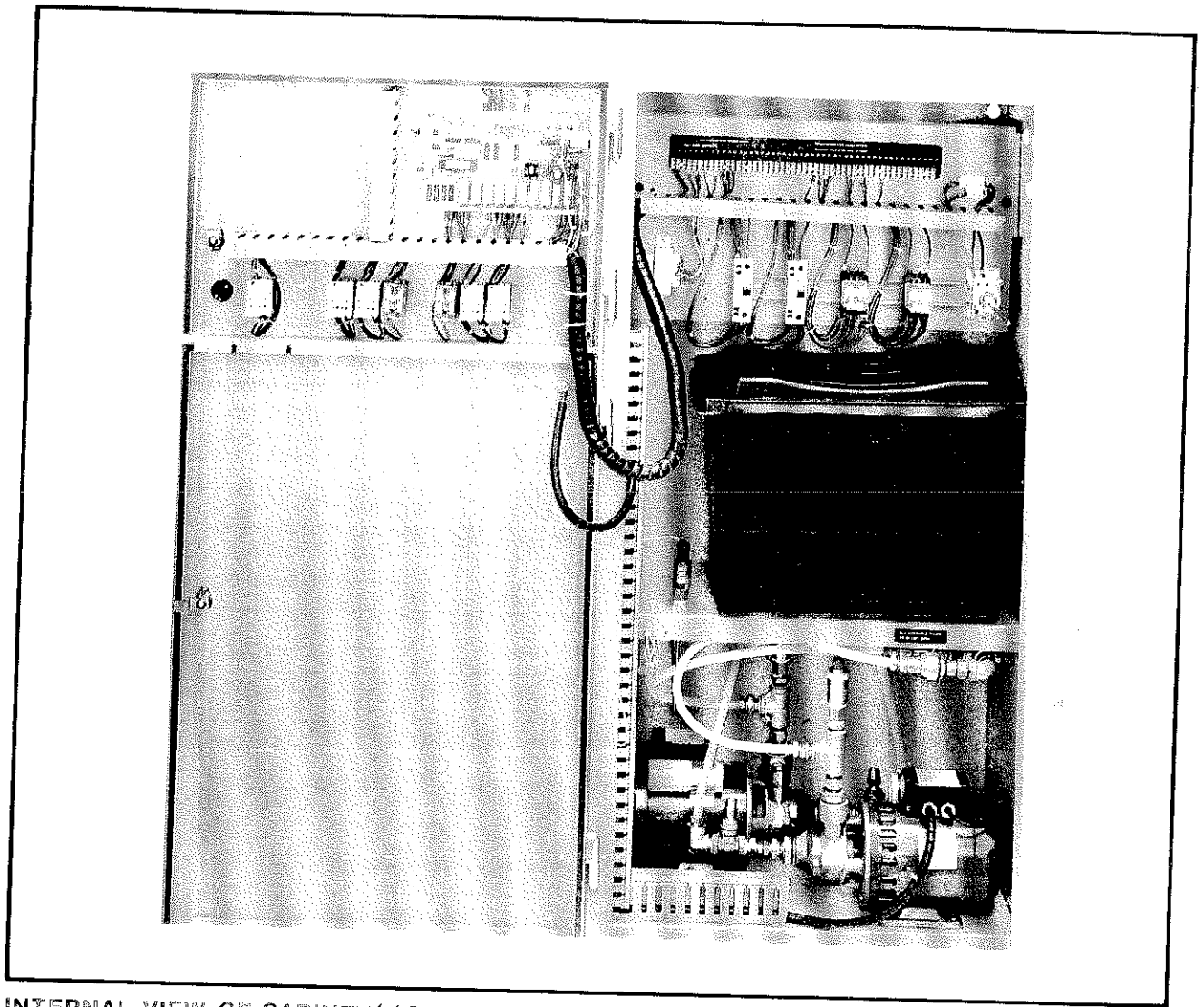
SCHEMATIC LAYOUT



PUMP & SAFETY VALVE SELECTION CHART

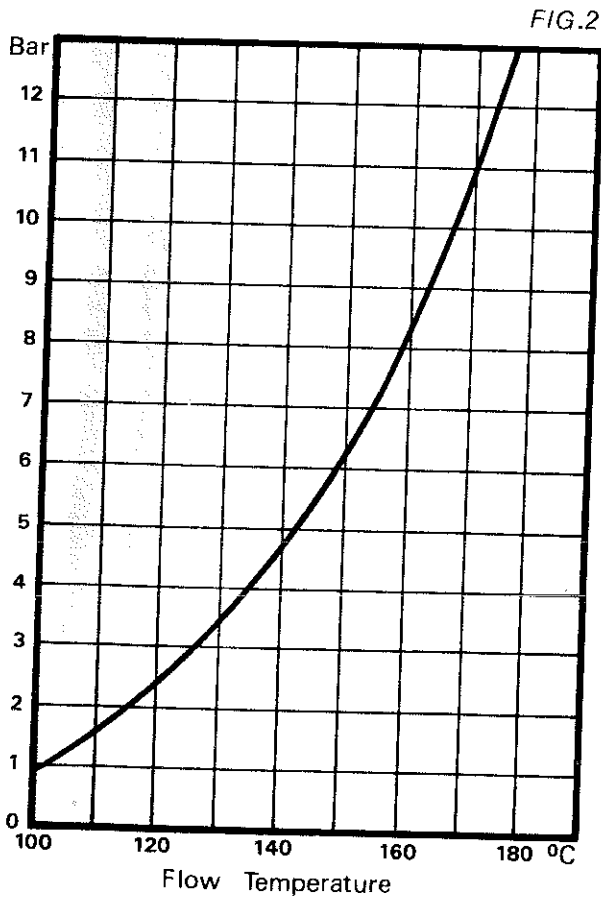
FIG.1



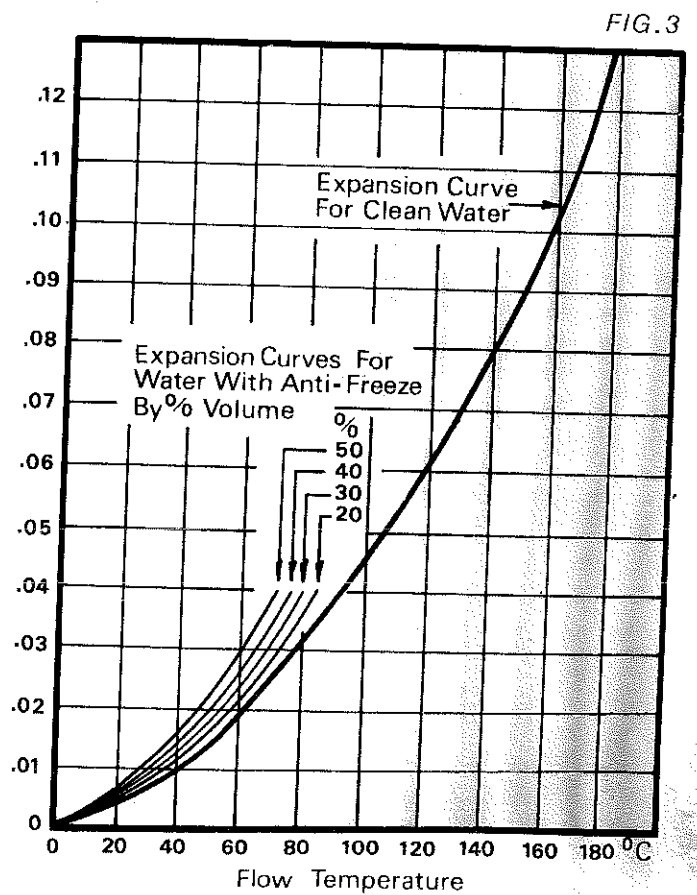


INTERNAL VIEW OF CABINET (1 SYSTEM SET / 2 PUMP SET)

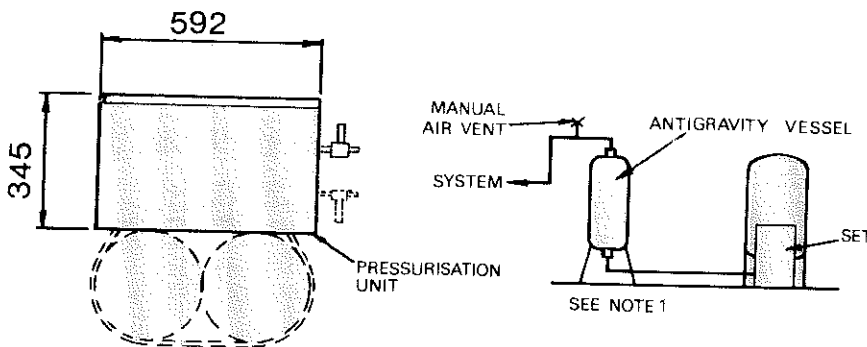
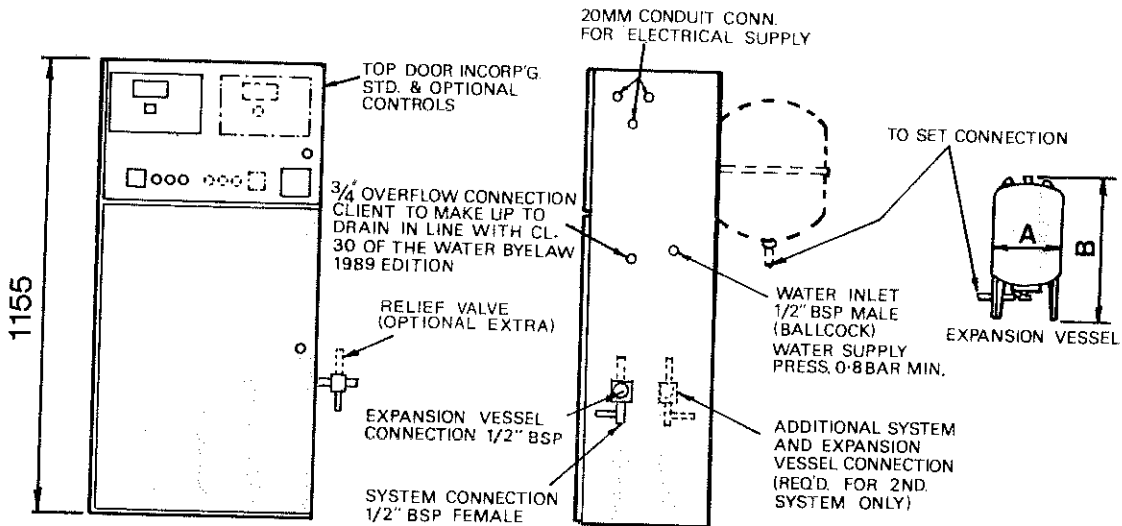
TECHNICAL INFORMATION CURVES
ANTI-FLASH MARGIN



COEFFICIENT OF EXPANSION CE.

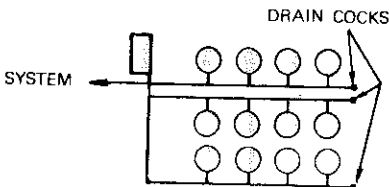


DIMENSIONS



INITIAL SYSTEM PRESSURE UP TO 6 BAR DEPENDENT ON PUMP SIZE.
 MAXIMUM ALLOWABLE SYSTEM PRESSURE 10 BAR DEPENDENT ON INITIAL SYSTEM PRESSURE.

- NOTES:
- 1 IF AN ANTIGRAVITY VESSEL IS SUPPLIED THE SET MUST BE CONNECTED TO THE BOTTOM VESSEL PORT AND THE SYSTEM TO THE TOP.
 - 2 NO PART OF THE SET, ANTIGRAVITY VESSEL OR CONNECTION PIPE IS TO BE LAGGED.
 - 3 UNDER NO CIRCUMSTANCES MUST WATER TREATMENT BE INTRODUCED TO THE SYSTEM VIA THE BREAK TANK EXCEPT WHEN A DE-MINERALISED WATER SET IS SUPPLIED. THIS SHOULD BE CONNECTED TO THE BREAK TANK BALLCOCK.
 - 4 THE 18L VESSEL IS THE ONLY VESSEL PACKAGED WITH THE SET AND ALL OTHER VESSELS ARE SUPPLIED LOOSE.



VESSELS CAN BE ARRANGED IN SERIES UP TO A MAXIMUM OF FOUR 500LITRE VESSELS PER LEG. FURTHER LEGS SHOULD BE ARRANGED IN PARALLEL AND POSITIONED TO SUIT FLOOR SPACE AVAILABLE.

A DRAIN COCK MUST ALWAYS BE FITTED ON THE END OF EACH LEG. THIS APPLIES TO SINGLE AND DUAL SYSTEM SETS.

| VESSEL SIZE (LITRES) | WEIGHT (KG) EACH | |
|----------------------|------------------|-------|
| | FULL OF WATER | EMPTY |
| 18 | 20.1 | 7.5 |
| 60 | 60 | 18 |
| 100 | 95 | 25 |
| 200 | 183 | 43 |
| 300 | 258 | 48 |
| 500 | 429 | 79 |

| LITRES | EXPANSION VESSEL | |
|--------|------------------|------|
| | A | B |
| 18 | 280 | 355 |
| 60 | 409 | 680 |
| 100 | 480 | 740 |
| 200 | 634 | 940 |
| 300 | 634 | 1110 |
| 500 | 740 | 1320 |

| PRESSURISATION UNIT WEIGHT (KG) | | | |
|---------------------------------|-------|---------------|-------|
| ONE PUMP | | TWO PUMPS | |
| FULL OF WATER | EMPTY | FULL OF WATER | EMPTY |
| 105 | 75 | 130 | 100 |

Note: Improvements in general design and modifications in detail will be embodied for the benefit of clients as and when introduced; consequently this specification is subject to alteration, as may be necessary, without notice.

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