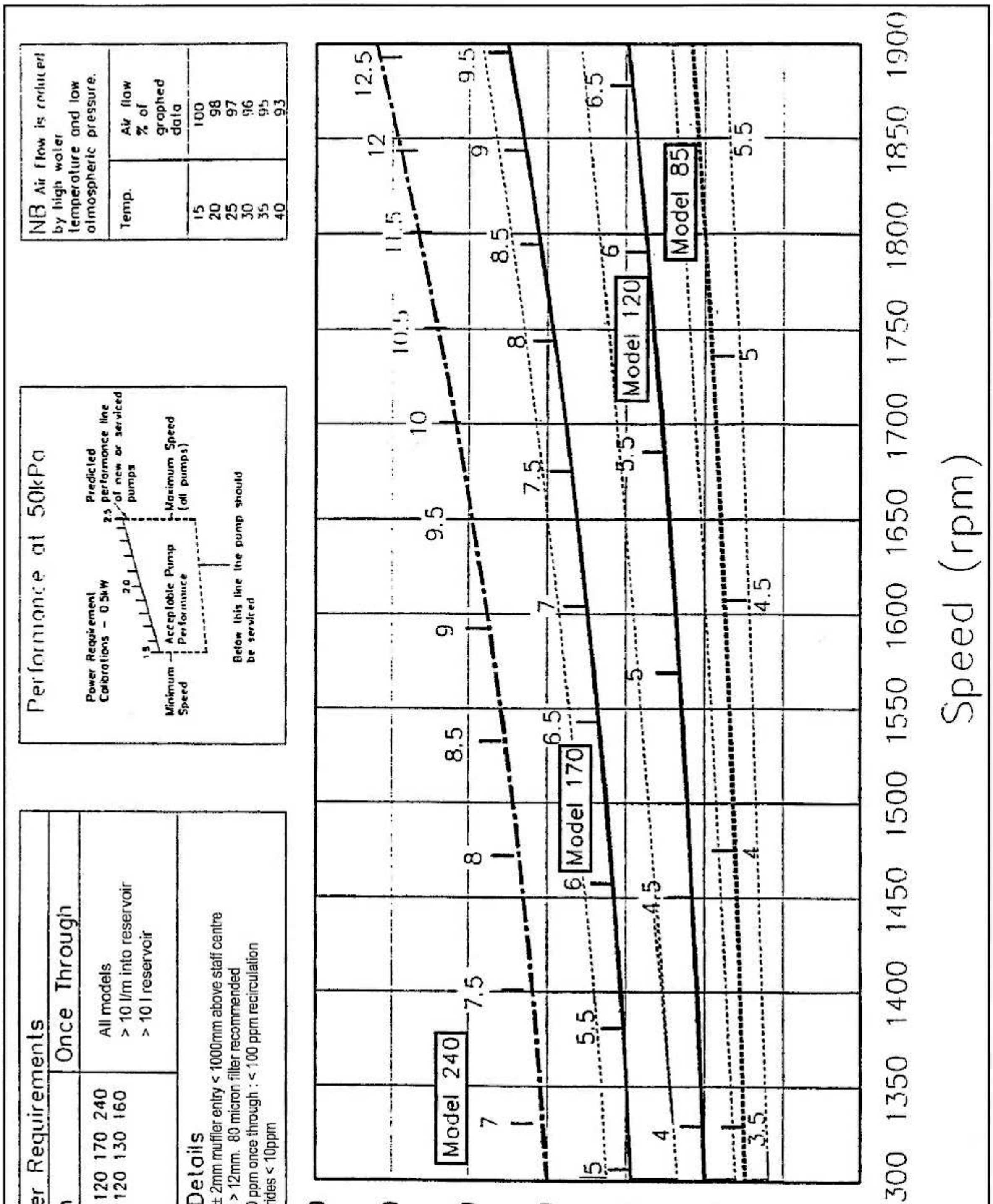
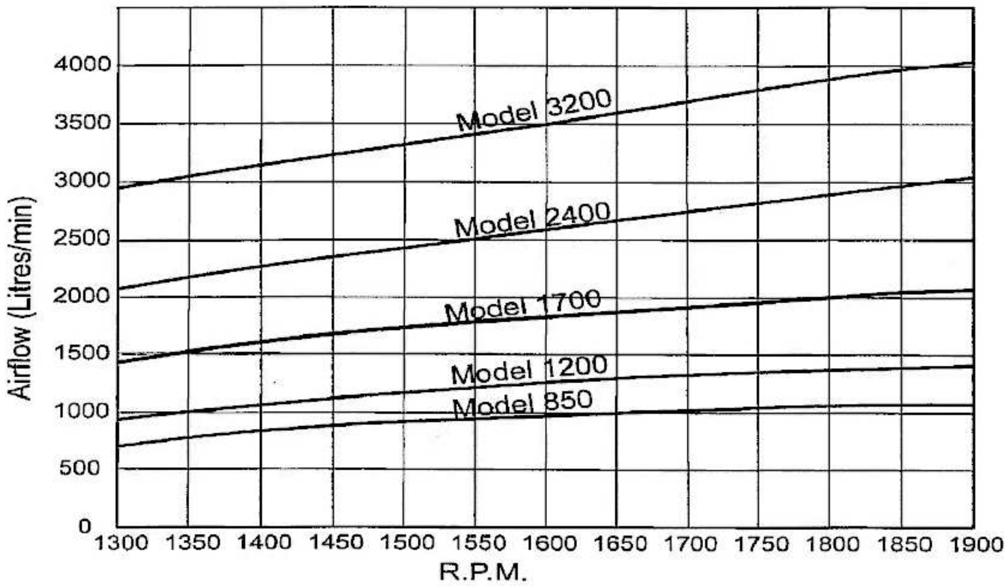
Water Ring Vacuum Pumps (Allflex)



Water Ring Vacuum Pumps (cont.)

Water Ring WR



Note: These water ring pumps are the same as the old models, ie Model 85 is now Model 850 with an improvement in performance.

Water requirement is 3.8 - 5.8 ℓ/min through pump.

Water Ring Compact - WRC

Close coupled pump and electric motor

Model	Motor Size	Air Flow 50 kPa	Air Flow 45 kpa	Air Flow 40 kPa
WRC 2	7.5 kw	2100	2450	2700
WRC 3	11 kw	2800	3350	3700
WRC 4	15 kw	3700	4400	4800

- The motor speed is 1450 rpm.
- Water usage 5 - 7 ℓ/min through resevior. Refer Manufacturers Manual pg 6, 7 and 3.8-5.8 ℓ/min through pump. Refer pg 11 of manufacturers watering manual.
- Minimum Speed for all three models is 1000 rpm

WATERRING VACUUM PUMP SIZING

Selection of the appropriate water supply system, pump, transmission and motor is the responsibility of the installer. Failure to include the appropriate correction factors as indicated in this section could result in unsatisfactory pump performance.

PUMP

Air Flow Capacity

The pump should be selected to satisfy the minimum air flow requirement of a dairy installation, **Qr**.

For pump to operate efficiently under conditions which differ from those described in the previous section of this manual, **Qr**, can only be obtained in practice if the pump model and speed selected provide an airflow greater than **Q**. **Q** is given by the equation below.

Predicted Airflow* Q = *K1.K2.Qr
For selection purposes:

> **Q** *is the "predicted" air flow for standard conditions as listed under the previous performance section.*
>
> **Qr** *is the "required" air flow at ambient atmospheric pressure and supply water temperature.*

The graphs under "Performance" in the previous section of this manual indicate the air flow rates that can be produced by the various pump models depending on the vacuum level required, under the standard conditions listed in that section.

Pump Selection Procedure

i Establish the required air flow, **Qr**.

ii Calculate the predicted air flow using the equation above.

iii Use Air Flow VS Speed Graph:
Follow the horizontal line from the vertical scale on the left hand side of the graph across at a height equal to **Qr**, until it intercepts the area representing air flow. This area will correspond to the pump model to be selected.

iv Follow a vertical line from this point of intersection down to the horizontal scale. The corresponding value on the horizontal scale at the end of the vertical line is the pump speed in revolutions per minute (rpm). This value is the required pump speed for the required air flow (**Qr**).

In instances where two models are able to produce the same required air flow, the model requiring the lower speed is selected. The pump rotating at a lower speed:

(i) consumes less power and

(ii) allows for an increase in air flow in future by increasing the pump speed.

EXAMPLE OF PUMP SELECTION

ASSUME:

The minimum required air flow of a dairy, **Qr**, is 2000 l/min at 50 kPa vacuum and the most adverse anticipated conditions of atmospheric pressure and supply water are:

$\mathbf{P}_{atm}$ 970 mbar (97 kPa)
$\mathbf{T}_{wat}$ 40° C (max. recommended)

THEN:

1. *Select the pump size and speed:*

Table 3: Air Flow Correction Factor K1 for Ambient Atmospheric Pressure Variation

Ambient Atmospheric Pressure (kPa)	Airflow Correction Factor K1 @ 50 kPa
105	0.94
104	0.95
103	0.96
102	0.98
101	0.99
100	1.00
99	1.01
98	1.03
97	1.04
96	1.05
95	1.07
94	1.09
93	1.10
92	1.12
91	1.14
90	1.16

Table 4: Air Flow Correction K2 for Supply Water Temperature Variation

Ambient Supply Water Temperature (C)	Airflow Correction Factor K2
10	0.99
15	1.00
20	1.02
25	1.03
30	1.04
35	1.05
40	1.08
45	1.10
50	1.14

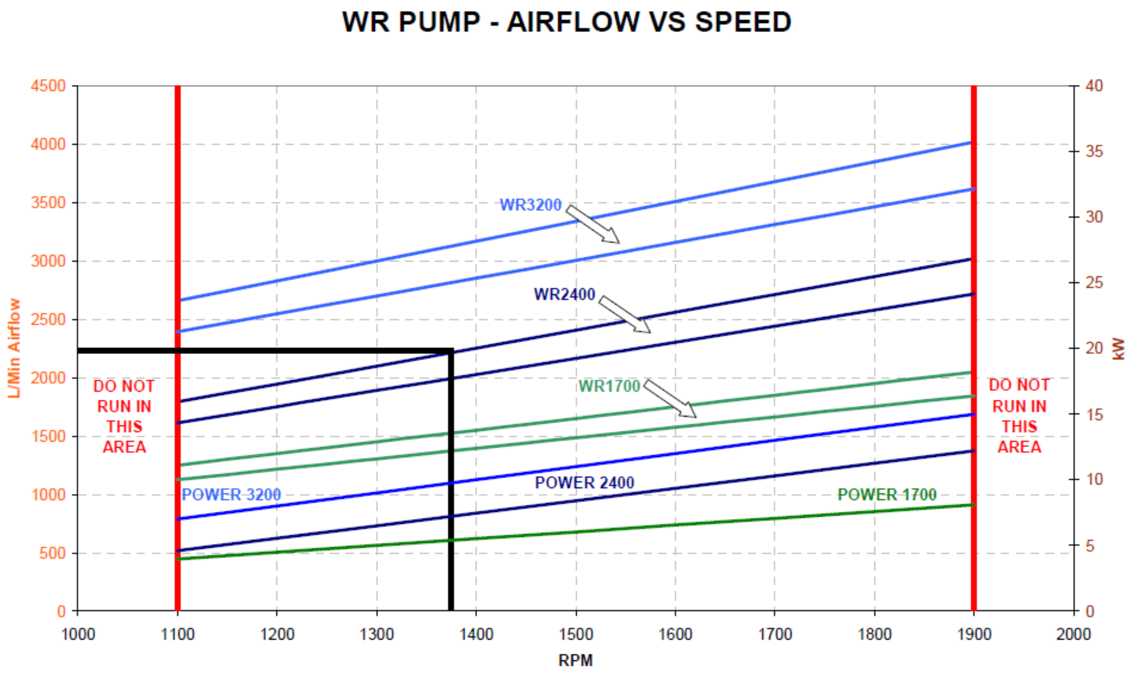
From Table 3, K1 is 1.04. From Table 4, K2 is 1.08.

Therefore the predicted pump capacity required under standard conditions is:

Eqn 1. **Q** **= K1 . K2 . Qr**
= 1.04 x 1.08 x 2000
= 1.123 x 2000
= 2246 (l/min)
= 2250 approx.

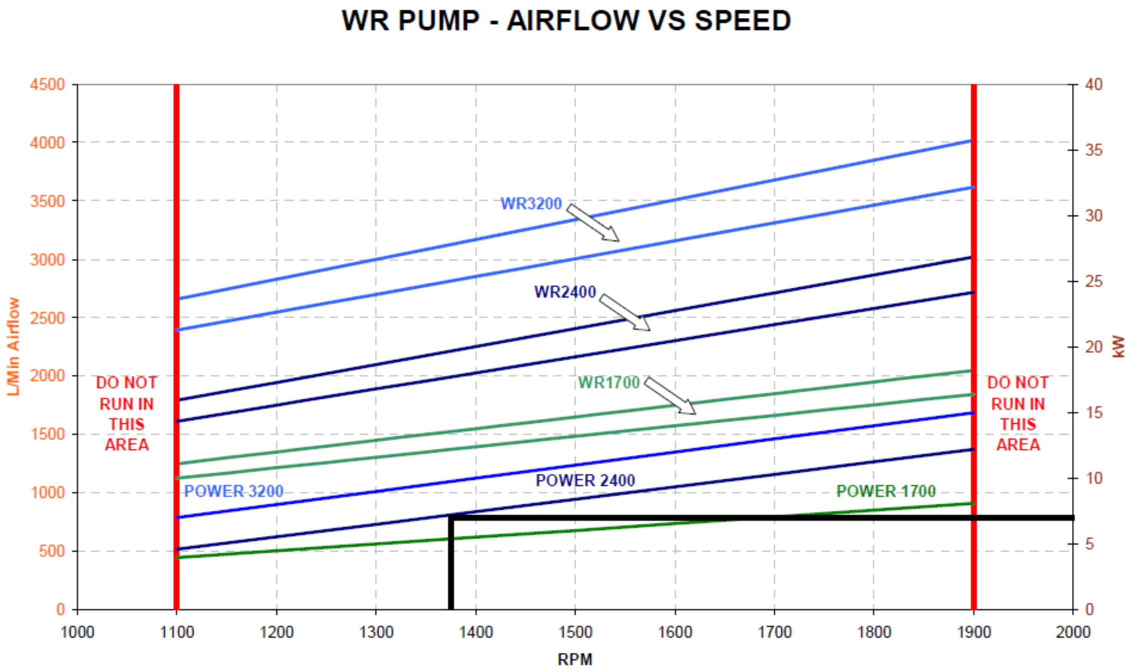
From Graph 2 below select a Model 2400 pump operating at 1375 to 1500 rpm.

NOTE: The top line values for **Air Flow** for each pump, indicated in graph 2 were arrived at under ideal conditions. Airflow figures should be decreased by 10% (bottom line values) to give a more realistic value for everyday use – the corrected performance for each pump should fall between these two values.



Graph 2

2. To determine pump power requirement.



Graph 3

From Graph 3 the pump will require a minimum 7 kW of power.

PUMP POWER REQUIREMENT

Graph 3 under "Performance" indicates the pump power requirement for the various models and required vacuum for the standard conditions described for predicted air flow, **Q**. The power requirement is dependent on pump speed and vacuum. The pump power requirement

for the desired model pump and speed can be read from the graph as follows:

(i) Follow a vertical line up from the required pump speed at the bottom of the graph until it intersects the diagonal "absorbed power" line for the selected model.

(ii) Follow a horizontal line from this point of intersection to the righthand vertical scale. The corresponding value on the vertical scale indicates the pump power requirement in kilowatts.

Note: See Figure 7 on page 22 for motor power requirements which include drive factors for V-belt systems.