



Pulsation in the Milking System

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PL190



Fig 1

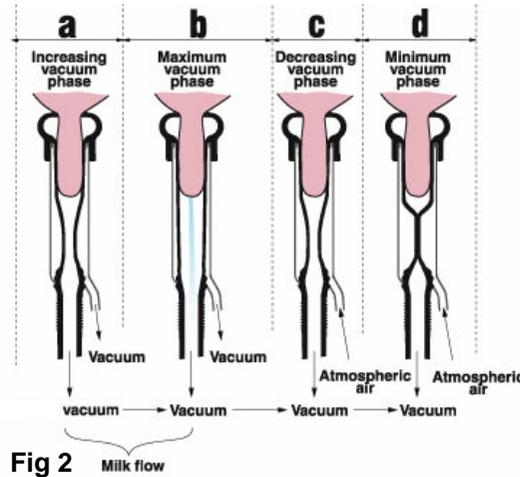


Fig 2

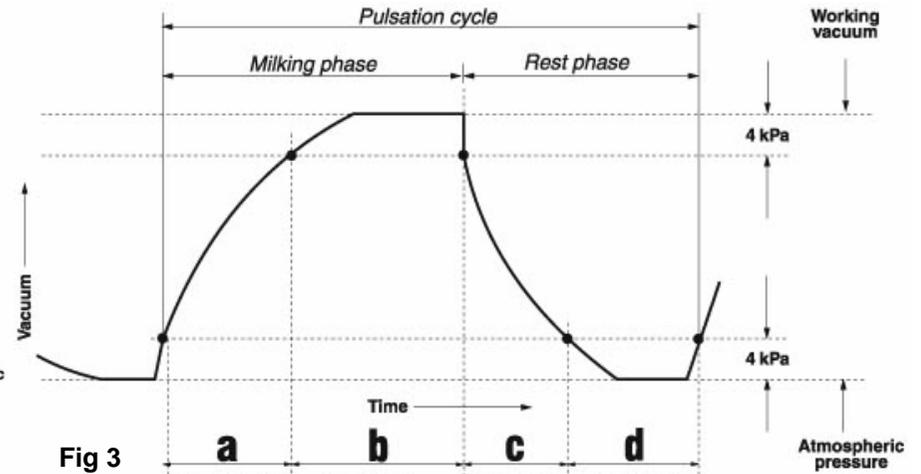


Fig 3

As the liner is the only part of the milking system to come into contact with the animal, the pulsation and vacuum are vital parts of the milking system. Where the vacuum assists milk to flow from the animal and transports it around the milking system, the pulsation is the cyclic opening and closing of the teatcup liner. The pulsator (PL190) produces these cyclic changes by applying either vacuum or air to the cavity between the teatcup and liner, to create the milking and rest phase of a pulsation cycle. As shown in figure 2.

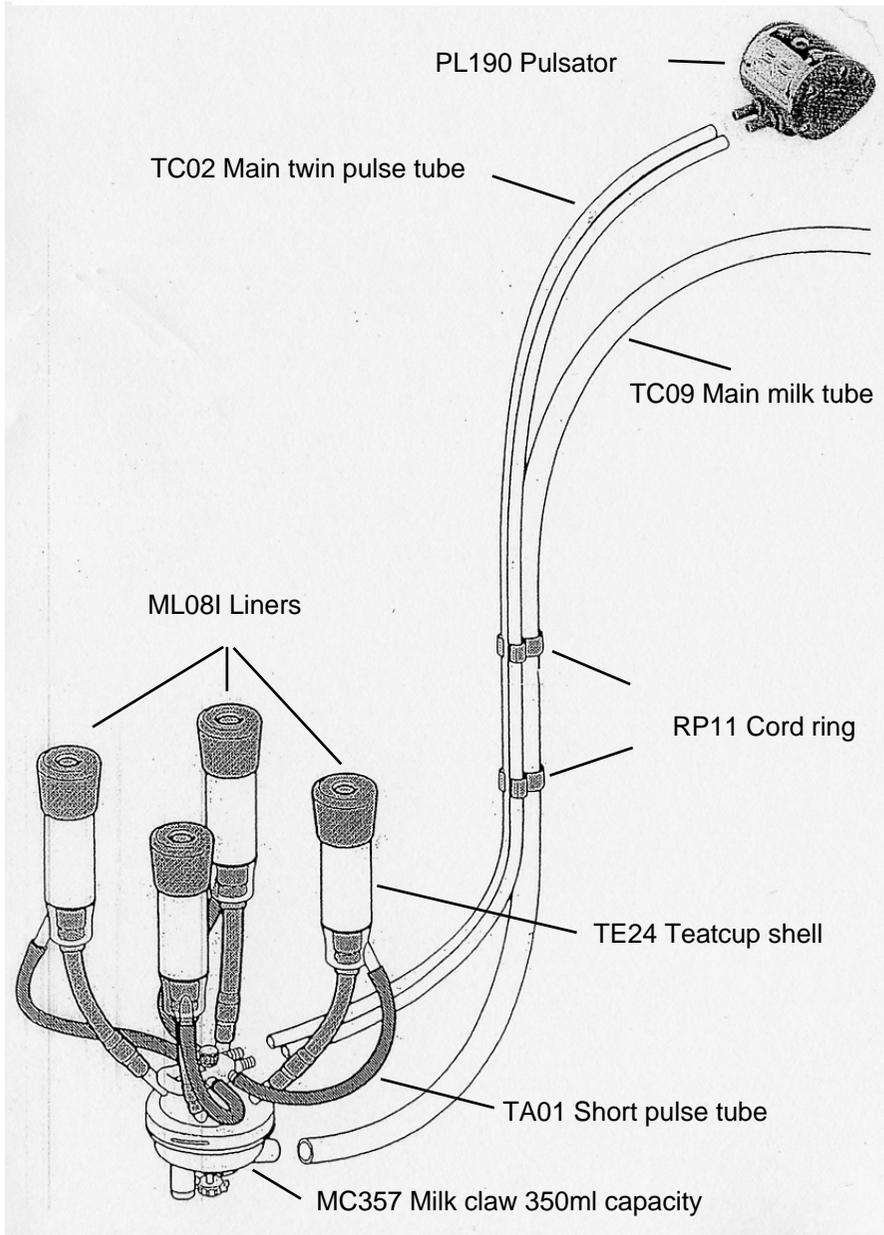
Figure 3 shows a **pulsation graph** of a complete pulsation cycle. These graphs are sometimes attached to the milking parlour test report along with a list of figures relating to the parlours pulsation system and vacuum level. Time is usually measured in milli seconds and the vacuum in kilo Pascals (kPa).

A **Pulsation cycle** is split down into 4 phases:

- a phase:** Vacuum to teatcup, liner opening start of milk flow.
- b phase:** Vacuum to teatcup, liner open, continued milk flow.
- c phase:** Air to teatcup, liner closing, start of massage.
- d phase:** Air to teatcup, liner closed, massage.

The milking phase (a+b) of the pulsation cycle is when vacuum is applied to both sides of the liner allowing the liner to open and milk to flow. The rest phase (c+d) is when air is applied to the teatcup cavity collapsing the liner for massage.

Example of alternate pulsation set up



There are two main methods of pulsation, alternate and simultaneous.

Alternate pulsation is when two of the teat cups on a cluster alternate their cyclic movement with the other two teat cups. Simplified slightly, two milking when two are at rest. This is normally denoted by the main flexible pulse tube to the cluster being a side by side moulded pair (TC02).

Simultaneous pulsation is the cyclic movement of all four liners in a cluster taking place at the same time. Normally a single moulded pulse tube supplies the cluster (TC05).

The specification of the pulsation is usually referred to in two ways, rate and ratio.

Pulsation rate: The number of times a liner opens and closes in one minute is defined by pulses per minute (ppm). You could normally expect to see a rate of 55-70 ppm for cattle. The rate controls the amount of time to open and close the liner in one pulsation cycle. When the rate is altered only the b+d phases change. The a+c phases are mainly governed by the vacuum level, liner and teatcup design, size and length of pulsation tubing and porting.

Pulsation ratio: Is expressed as a percentage of the pulsation cycle during which the liner is more than half open. It would commonly be stated as 50:50, 60:40, 65:35 and 70:30 showing the percentage ratio between the milking and rest phases respectively.

Examples of vacuum and pulsation settings

Animal breed	Vacuum level [kPa]		Rate [ppm]	Ratio [%]
	High line & bucket	Low line		
Cow	48 - 50	42 - 44	60	60:40
Goat	42 - 44	38 - 40	90	60:40
Sheep	40 - 42	36 - 38	120	50:50
Buffalo	50 - 52	44 - 46	60	60:40