Pump Protection (Centrifugal) Using Maric Flow Controllers

MARIC FLOW CONTROL AUSTRALIA

Maric Constant Flow Valves

Constant Flow Rate Regardless of Pressure

50 Years

Est. 1963

A tamper-resistant method, of protecting centrifugal pumps from running off their curve, is to place a correctly sized Maric flow controller, close to the pump discharge.

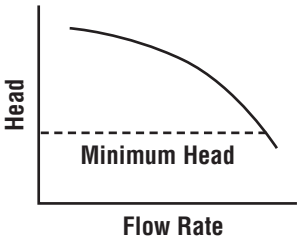
Introduction:

A common cause of centrifugal pump failure, is from cavitation or up-thrusting, through having been allowed to "run off their curve".
For long, trouble-free life, flow rate and head should be maintained within manufacturers specifications.

Why use a Maric Flow Controller?:

For centrifugal pumps, limiting maximum flow rate, ensures a particular head is achieved.

Therefore, because Maric valves limit maximum flow rate, they are useful for keeping pumps on their curve.



An added bonus is, they are tamperproof, preventing unauthorised adjustment, and they require no maintenance.

A typical pump performance curve is shown to the left

Alternatives:

Gate valves and pressure sustaining valves are often used to apply head, however, their disadvantages include:

- reduced pump output ,(efficiency), at the duty point through unnecessarily high headloss
- adjustment by the untrained
- failure due to wear
- they require maintenance

Maric constant flow valves offer protection without these disadvantages.

Maric 50mm x 3 orifice screwed brass flow controllers

Headloss:

Maric flow controllers are particularly ideal for submersible installations with a high standing water table.

The Maric valves are designed to control, (or limit) flow rate, regardless of pressure changes.

I.e., its orifice diameter varies automatically. It orifice opens as the pressure differential across it reduces, and vise-versa.

Therefore, headloss will be what ever it needs to be, in order to maintain the set flow rate.

For pump protection purposes, the flow rate selected for the Maric valve, is usually close to the right hand side of the pump curve.

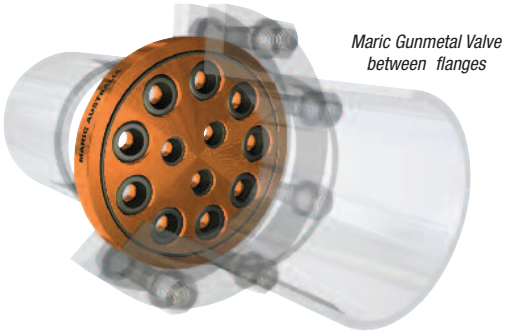
But quite often, the duty point of a pump is well in from the right hand side of the curve.

In the case of a high standing water table, where the duty point flow rate, is less than the rated flow of the Maric valve fitted, then the headloss across it is ***significantly*** less then 140 kPa.

For example, when flow through a Maric valve is 70% of its rated flow, its headloss is 40 kPa only. (See Maric curve over the page)

This is a significant benefit over "fixed orifice" gate valves, whose orifice remains relatively restrictive at the duty point, reducing pump output and efficiency.

So, Maric valves ideally suited to High Standing Water Table installations, where the Maric valve is only operating within



Maric Gunmetal Valve between flanges

its spec. at start-up. At lower flow rates, it has little impact on pump output.

Question: What will the headloss across the Maric valve be?;

Answer: It depends on the flow rate.

I.e, at the valves full rated flow, headloss will be between 140 and 1000 kPa. (for "Precision" spec. valves).

At lower flow rates, (i.e., the duty point), headloss will be less. e.g., 50% of the valves flow = 30 kPa headloss only.

Submersible pump installation

Pumps can be damaged through inadequate head on:

- **Any bore**, where people can unwittingly open up the bores' gate valve in an attempt to increase flow.
- **High draw-down bores**, i.e. a high standing water table at start-up, as compared to a lower level for the normal operating condition.
- **Empty pipe work at start–up**, i.e. lack of, or faulty check valve, or where lines on surface drain empty.
- **Over-pumping beyond the refill rate**, to point of drawing in air or sand.
- **A burst in the pipework**.
- **Pumps with two separate duties**: (A), a tank elevated 50m up a hill, and (B), The other, to feed a dam at the same elevation as the pump. (Inadequate head on the lower elevation duty.)
- **Pumping into a main where pressure is fluctuating**.
- **Rising water tables**: Limiting pump peak flow rate can prevent electric motors from overloading as operating head reduces.
- **Where regulators restrict pumping from a river**: It is a requirement that a non-adjustable flow control device is used.

Key features of Maric Flow Controllers:

- **Constant flow rate:** regardless of pressure.
- **Tamperproof:** Maric valves are non-adjustable, eliminating unauthorised adjustment.
- **Maintenance free, reliable and self-cleaning;** As there are no wearing parts, the valves require no maintenance, adjustment or cleaning during their 20+ year life span.

www.maric.com
Telephone:
08 8431 2281
(+61 8 8431 2281)
Facsimile:
08 8431 2025

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Maric Constant Flow Valves

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50 Years Est. 1963

Case Study: Franklin FPS1A-13TS

Using Maric flow control valve for pump protection in a high standing (high draw-down) water table installation.

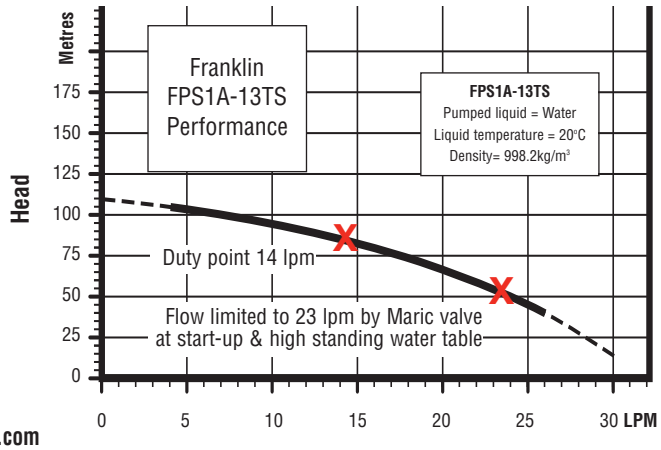
This pump suits the application at the 85m draw down level, however, it will run off the right hand side of curve with only 20m head against pump at start up resulting in pump and motor damage.

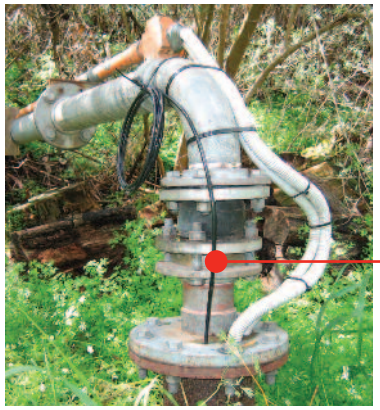
Installation Details

• Pump	Franklin FPS1A-13TS
• Flow Controller	Maric 23 litre per minute Precision
• Pump depth	110m
• Standing water table	20m
• Typical draw down water level	85m
• Max flow allowed (rhs of curve)	1.55m3/hr (26.0 lpm)
• or, Min. Head required	43m
• Duty	To fill tank at ground level adjacent borehead

Pump Selected; Franklin FPS1A-13TS

Manufacturers performance curve below indicates flow should not exceed 1.55m^3/hr (26L/min).





Gunmetal wafer type valve mounted between flanges

Pump Protection Requirement

To limit flow, or add sufficient head, during start-up, to prevent pump and motor damage due to upthrust condition.

Three options available

1, Gate Valve: They are cheap, can be noisy and can also result in a high headloss at the duty point, reducing pump output. As these valves can be adjusted by anyone, they are **not tamperproof**, and are often opened all the way in the endeavour to get maximum flow and can fail due to gate vibrating loose.

2, Pressure Sustaining valve: These are expensive, adjustable, and can result in a potentially high headloss at duty point, reducing pump output. Again, as they are adjustable, they are **not tamperproof**, and are often opened all the way in the endeavour to get maximum flow.

3, Flow Controller: These are the **best solution** for high standing water table, with lower duty point conditions. **They are tamperproof**, inexpensive and result in a low headloss at the duty point as can be seen in the graph below.

Question:

What will the headloss be across the Maric valve and its affect on pump performance at the 85m duty point?

Answer:

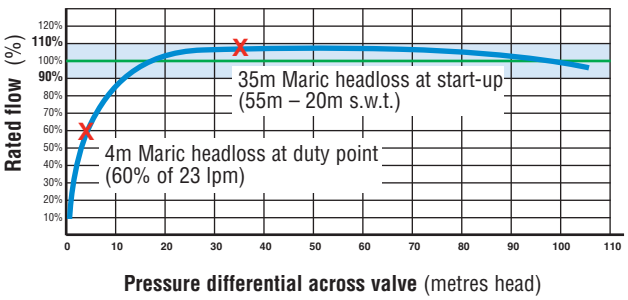
Very little. Around 3 metres.

Why?:

At 85 metres drawdown (and resulting head against pump), flow rate will be 0.85m3/hr (14 lpm) only . This is 60% only of the rated flow of the flow controller, and at 60% of flow through the Maric valve, the pressure differential, (or headloss) is around 4 metres only, having little affect on pump output.

Flow Control Valve Performance:

Flow control valve performance curve below indicates 60% of rated flow = 4 metres headloss only (see **X**).



Conclusion:

As in the above application, and many similar cases, the Maric flow control valve is an excellent choice for pump protection, due to its lower headloss, cost effectiveness, long maintenance free life and being **virtually tamperproof**.

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