



T&T Pump Co., Inc.
Fairmont, WV



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REFERENCE: Up-thrusting of multistage booster pumps

One of the most common problem situations experienced by multi-stage booster pumps is "up-thrusting". Up-thrusting occurs when fluid is allowed to flow through the pump while the pump is not in operation, normally during a RO flush cycle. When the rate of flow through the pump is great enough two reactions occur: 1) The pump shaft and impellers are thrust forward into the diffuser, and 2) The impellers and pump shaft begin to rotate. This combined forward thrust and rotation is detrimental to the pump's service life.

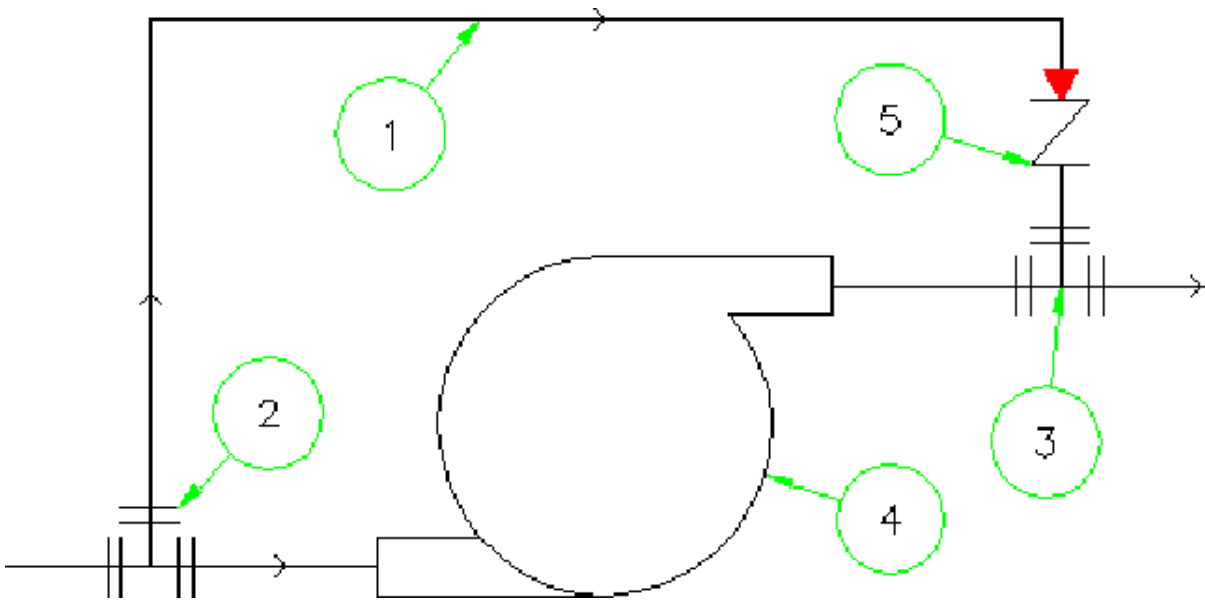
T&T pumps have an up-thrust pad that is designed to protect against **momentary** up-thrust conditions. The up-thrust pad prevents the impeller from making contact with the diffuser. However, the up-thrust pad will not protect against prolonged up-thrusting. The damage occurs from the prolonged turbining with the impeller in contact with the diffuser. The pump shaft and impellers rotate and grind against the diffuser, thus damaging the pumping components.

These conditions are true for any multi-stage booster pump and preventative measures should be implemented to assure long services lives of the pumps.

The cost of implementing these measures far out-weighs the cost of replacing expensive multi-stage booster pumps.

T&T recommends the use of a bypass system that directs the fluid flow around the pump, or operating the pump during the RO flush cycle. Operating the pump creates down-thrust and counteracts the up-thrust. The down-thrust produced is carried by the thrust bearings during normal operation. A bypass diverts flow around the pump when the pump is not in operation. The following page describes the general arrangement of the bypass. This arrangement does not require that a technician be present during flush cycles.

General arrangement for bypass:



1. Bypass line — Bypass line should be no smaller than the pump suction inlet.
2. Tee or other suitable means of connecting the bypass line to the suction plumbing. The connection needs only be rated for the max feed pressure to the pump.
3. Tee or other suitable means of connecting the bypass line to the discharge side of the pump. The connection must be rated for operation at the max discharge pressure produced by the pump.
4. Multi-stage booster pump
5. Check valve — The check valve must be rated for the max pressure produced by the pump. Plumbing on the down stream side of the check valve must be rated for the max pressure produced by the pump.

The bypass works on the principle that fluid will travel in a path that offers the least resistance. During periods when the pump is not in service most of the flow will divert through the bypass. When the pump is in service the check valve closes and no flow is allowed through the bypass.

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