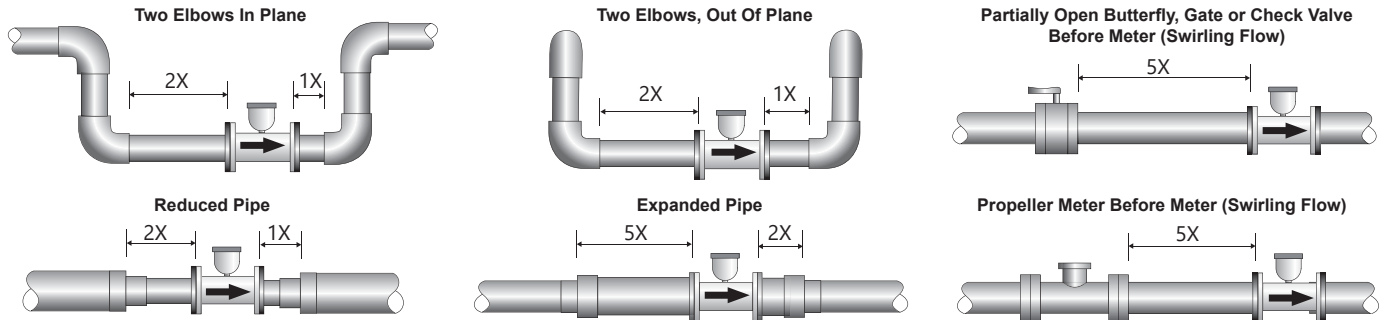


NOTE: These configurations are to be used as general guidelines and do not cover every possible installation. A combination of two or more obstructions will require additional straight pipe. If there is any concern about the length of pipe required for a specific application, please contact your local dealer.



**Installing a meter after a pump.** Most meters will be installed in systems with some sort of pump, and while the pump is unlikely to have a negative effect on meter performance, there are some situations where understanding the effect the pump has on the flow profile, and by extension on the meter will be of utmost importance.

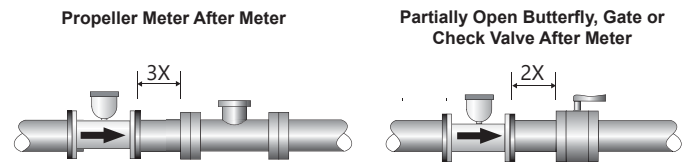
Air vents should be installed in the same unobstructed pipe run as the meter and should be located relatively close to the meter. Constant bleed air vents are recommended because simple check type air vents will not open once the system is under pressure and an accumulation of air can build up behind them. Significant amounts of air entrained in the flow of water, wildly erratic flow profiles and water that travels through the pipe with significant swirl will cause the meter to read erratically, sometimes very erratically, or not read at all. Therefore, the designer or installer must reduce or eliminate these issues when they are likely to occur.

Every installation is different, but we can offer some general guidelines when it comes to the placement of your pump and meter. And again, in most cases, the pump will have no, or very little effect on the meter's performance, but some care should be taken to assure your installation has the best chance for success.

**Confirm there is adequate head to insure a full pipe of water through the meter (a valve downstream of the meter may be required).**

**Vertical Turbine Pumps** drawing from deep wells, or from well under the surface of the water will generally have very little effect in the flow profile of the water by the time the water reaches the meter.

**Short Coupled Lift Pumps** can, but will not necessarily, cause an erratic or swirling flow profile. Care must be taken during system layout to avoid these issues. The inlet of these pumps will be located near the surface of the water supply and can both suck air from the surface and swirl the water around the pump. This swirling water itself may be a contributing factor of poor flow profile and also lower the surface of the water over the pump inlet.



The absolute minimum depth of the inlet of the pump can be calculated using this formula,

$$S = D + (0.574Q/D^{1.5})$$

Where

S=Submergence in inches

D=Pump bell diameter in inches

Q=Flowrate in gallons per minute

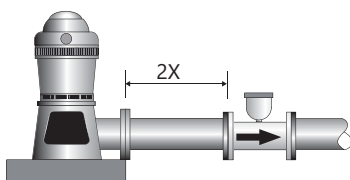
Note: to raise D to the power of 1.5 (3/2) as shown in  $D^{1.5}$  Take the square root of D and cube the result.

Be sure to calculate from the minimum water level during all seasons of pump operation.

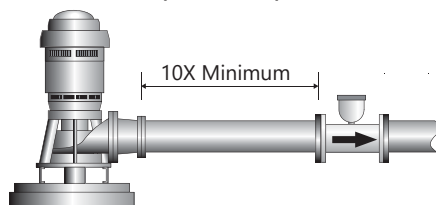
If the water supply will be located in a confined area such as canal turn out, and especially if the turnout ends in a cylindrical vault, the motion of the pump can result in significant swirl of the water being sucked through the pump and this will cause the meter to perform poorly. Be sure to take steps to keep the water from swirling or meter performance will be affected.

**Booster Pumps before the meter** can also cause swirl or an erratic flow profile. If a booster pump is located before the meter, it must be located far enough upstream that the flow profile has a chance to return to normal. Every case will be different, but we recommend a minimum of at least 10 pipe diameters after the booster pump and before the meter. By the very nature of their purpose, booster pumps will also cause low pressure in the pipe upstream of the pump. If this low pressure falls low enough, it may open any air vent upstream of the pump which will cause air to enter the water stream. In this case, the entrained air will likely cause the meter to go into an empty pipe state.

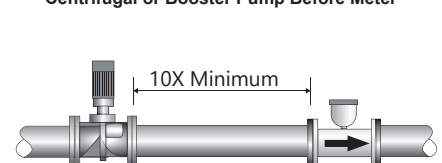
Vertical Turbine Pump Before Meter



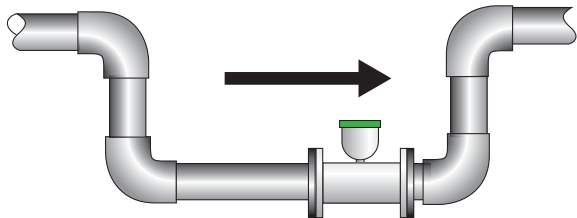
Short Coupled Lift Pump Before Meter



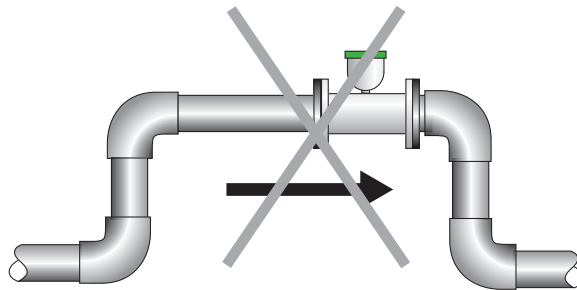
Centrifugal or Booster Pump Before Meter



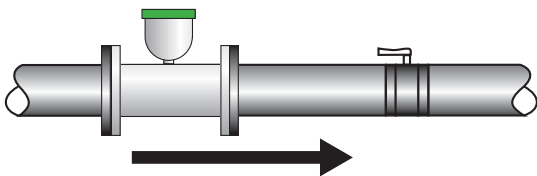
**FULL PIPE RECOMMENDATIONS**



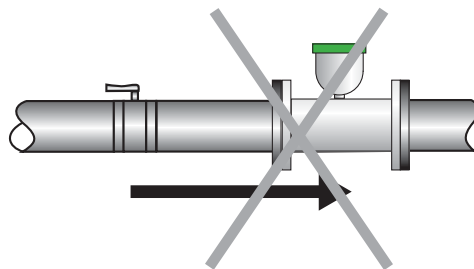
**Recommended:**  
Keep pipe full at meter for accuracy



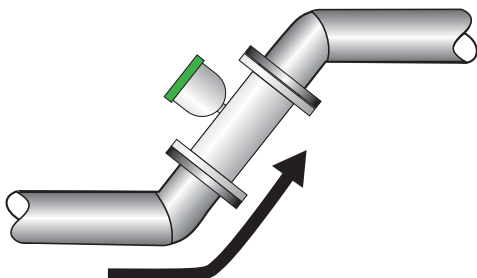
**Not Ideal:**  
Allows air pockets to form at meter



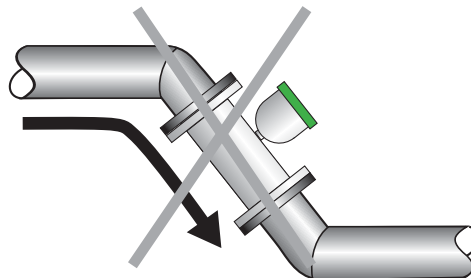
**Recommended:**  
Keeps pipe full at meter for accuracy



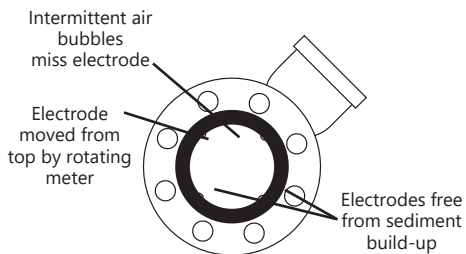
**Not Ideal:**  
Post-valve cavitation can create air pocket



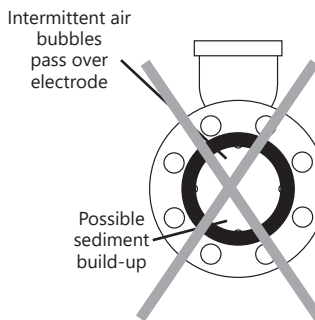
**Recommended:**  
Allows air to bleed off



**Not Ideal:**  
Air can be trapped



**Recommended:**  
Improved accuracy results from unimpeded electrodes



**Not Ideal:**  
Air bubbles and sediment on the electrodes can affect accuracy