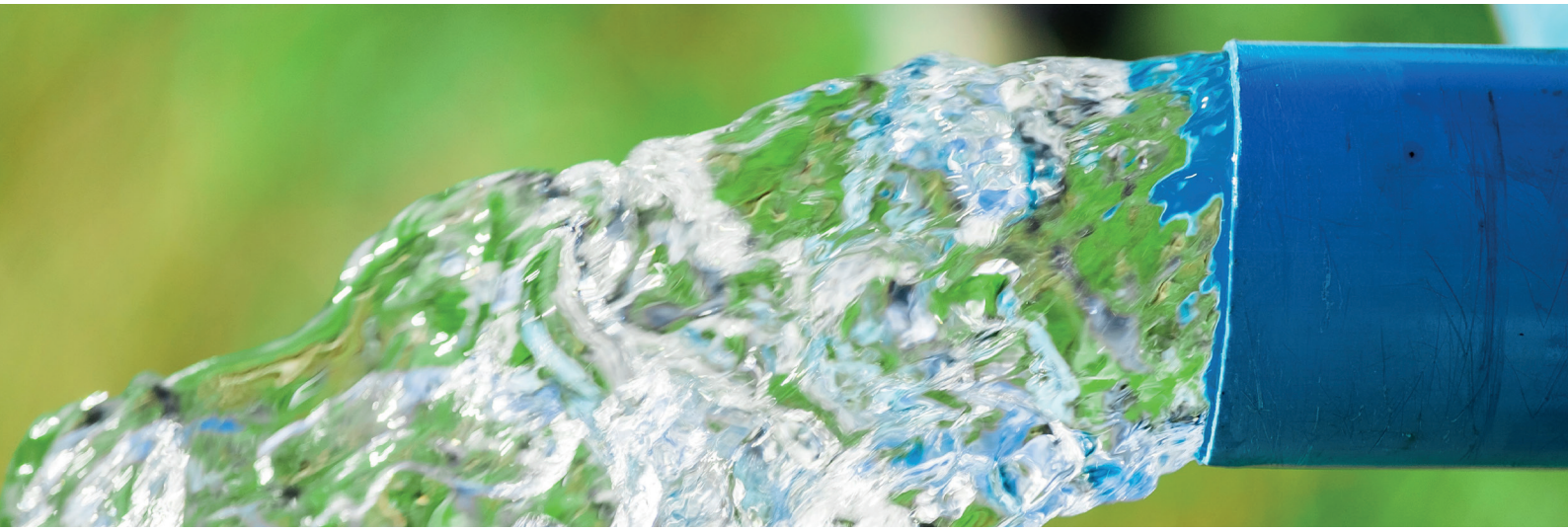
kamstrup

What you need to know about electromagnetic flow meters



An electromagnetic flow meter (MAG meter) measures water flow by applying a magnetic field perpendicular to the flow. As water passes through the meter, it induces a voltage that, combined with the meter's inside diameter, can be used to calculate the volumetric flow rate

While common topics such as water hammers, poor flow profiles and temperature shocks provide the same issues for both static and non-static meters, there are some additional challenges specific to MAG meters. For a MAG meter to function properly, special care must be taken during the installation, as even the best MAG meters will struggle to perform in non-optimal installations.

Electrical noise

The electrical signal generated in a MAG meter is on the nano-volt scale and any additional voltage at the same frequency registered by the meter will count as extra flow. While the meter manufacturers put a lot of effort into preventing any stray voltage from being picked up, you should take into account the following challenges, during selection and installation:

- **Grounding**: A MAG meter without the proper grounding electrodes, rings and brackets as well as the necessary amount of grounding electrodes will more easily register electrical noise as flow. An electrical potential difference between the pipes on each side of the MAG meter will cause any exchanged electrons to be registered as additional flow.
- **Piping**: Plastic piping or if the water flow is fully isolated from the ground, adds an extra challenge as the water then generates static electricity that can be registered by the meter as additional flow. Therefore, a full plastic pipework requires thorough grounding.
- **Chemicals**: Depending on the nobility of the measuring electrode material, some chemicals (typically chlorides or chlorites at larger concentrations), can react with the electrodes and release electrons that will be registered by the meter as additional flow.
- **Particles**: Sand particles in the water flow that hits the measuring electrodes will release small electrical charges that may be mistaken for additional flow by the meter.
- **Meter design**: During installation, it is important to take the design of the MAG meter into account as some meter use the surrounding pipework as a grounding reference for the electrical signals. If all these pipes are isolated, their measurement reference will be erratic unless the meter is grounded directly.

Vacuum

Sudden hard vacuums due to poor use of valves, steam reduction and accidental blow outs can rip or remove the MAG meter's lining, which will effectively result in a complete failure of the meter. Non-reinforced plastic and PTFE-lined meters are known to be particularly vulnerable to this.

Corrosion

The inside of a MAG meter is often isolated based on a grounding reference due to the need for a non-conductive surface. In cases where the meter is insufficiently grounded, any exposed metal then becomes vulnerable to galvanic corrosion – especially in systems made with plastic piping.

Galvanic corrosion happens in insufficiently grounded systems that contain two metals of different nobility that are both in contact with a conductive fluid. Often, the metal affected by the corrosion will either be a grounding electrode or a measuring electrode. These will act as sacrificial anodes and once they have corroded, the meter will most likely cease to function properly.

Swelling

Choosing a lining or composite material that is incompatible with any of the chemicals found in the water, will cause swelling in the plastic and elastomers. The resulting water ingress will initially cause a minor short circuit of the measuring circuit and thereby increase the signal loss resulting in a poorer signal to noise ratio. In the long term, the swelling will cause the MAG meter to stop functioning and the elastomers and polymers will break apart.

Summary

When selecting a MAG meter supplier, it is crucial that you choose one who can advise you on the correct choice and installation of the meters.

Incorrect or lack of advice can lead to the challenges described above, resulting in poor measurement performance, additional commissioning work, possible permanent damage to the meter and an overall poor experience with the MAG meter.

If the installation is done correctly, the meters will serve you faithfully for up to decades.

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