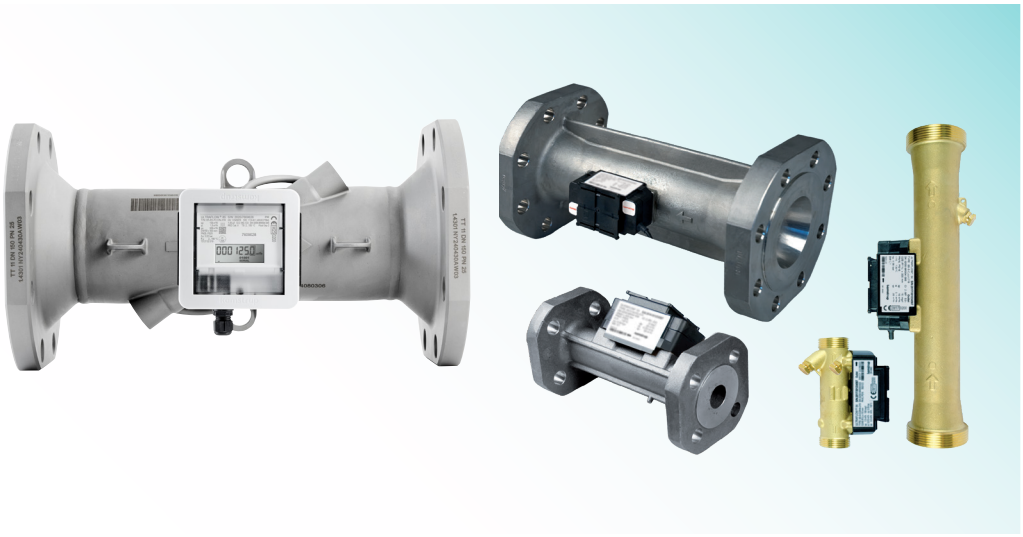
The importance of correct flow sensor dimensioning



Occasionally, we encounter installations with issues due to under-dimensioned flow sensors. Even though it might be tempting to use under-dimensioned flow sensors to lower costs, here's why this approach should be avoided.

The importance of correct flow sensor dimensioning is often devalued, and the consequences are severe. That is why we constantly focus on the pipe dimension matching the flow in order to operate the system at the lowest cost while ensuring the required supply of energy.

Definition of under-dimensioning

This brings up the question of when a flow sensor is considered to be under-dimensioned. Flow sensors dimensioned to a continuous operating flow between qp (nominal flow) and qs (maximum flow) are under-dimensioned. The correct dimensioning parameter of the flow sensor is the nominal flow qp (m^3/h). According to EN 1434 and CEN TR 13582 the range between qp and qs is only to be used briefly - less than 1h/day or 200 h/year.

The consequences of under-dimensioning

Choosing an under-dimensioned flow sensor might save you some money at the time of purchase. However, even though the regime from qp to qs is metrologically approved, operating flow sensors above qp causes higher pressure losses, because the pressure loss increases with the square of the flow, and demands an increase of the static pressure in the system to suppress cavitation. Both incidents will have serious consequences: Increased operational costs due to the need of a bigger or additional circulation pump, increased costs to balance the system, an unstable system, and in worst case the installation cannot supply the necessary volume and energy to obtain the required comfort temperatures.

The consequences of over-dimensioning

Even though over-dimensioning might not occur as often as under-dimensioning due to higher investment costs of a larger flow sensor, it shall be noted that over-dimensioning is neither a technically good solution. In that case the flow sensor would predominantly operate at the lower end of its operating range. When considering the maximum permissible error curve of a flow sensor, which allows up to max ±5% at the lowest flow, over-dimensioning might introduce larger errors in the yearly billing.

How to dimension your flow sensor correctly

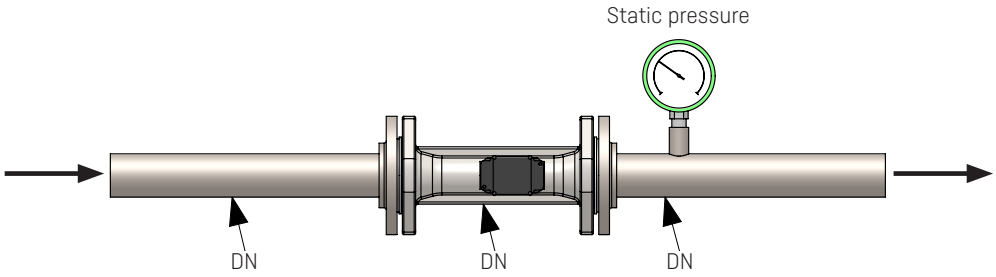
When dimensioning your flow sensor, two major conditions must be stated: pipe dimension and maximum design flow of the system. Regarding pipe dimension, going one dimension up or down in meter size next to the installation site of the flow sensor will in general cause no problems. In case that pipes in the installation deviate by more than one dimension, a smooth transition from the installation pipes to the measuring section, where the flow sensor is installed, shall be established e. g. by building more than one transition step as indicated in the figure below. Other smooth transitions might be equally acceptable. In addition, the second condition – the maximum design flow shall not exceed the nominal flow of the flow sensor – shall be complied with.

The static pressure at flow sensor outlet must at all times be above the minimum requirement.

Please find information on qp, dimension size and minimum static pressure in the Technical description for ULTRAFLOW® 54 at:

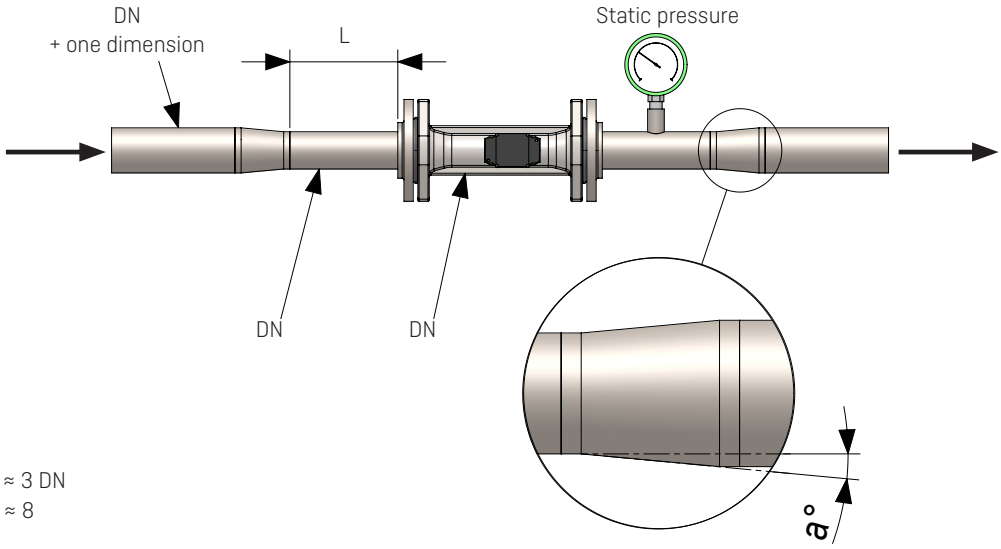
www.kamstrup.com

Recommended



Max design flow of system ≤ qp of the flow sensor

Tolerated



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