JLC International
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Selection of the Measuring Point

The correct selection of the measuring point is crucial to success in achieving reliable measurements and a high accuracy. Preconditions for obtaining good measuring results are:

- A pipe that can be acoustically propagated.
- A fully developed axi-symmetrical flow profile.

Acoustic Propagation

Acoustic propagation can be assumed when pipe and medium do not attenuate the sound so that the signals get completely absorbed. Sound attenuation depends on:

- the kinematic viscosity of the liquid,
- the proportion of gas bubbles and solid particles in the liquid,
- deposits on the inner pipewall,
- the wall material.

When a measuring point selection is being made, make sure that,

- the pipe is always filled completely where the sensors are positioned,
- no bubbles and deposit material accumulate in the pipe at the measuring point. (Also bubble-free liquids can form gas pockets where the liquid expands, e.g. especially behind pumps and where the cross-sectional area of the pipe extends considerably.)

Undisturbed Flow Profile

Many flow elements cause disturbances of the flow profile in the pipe, e.g. elbows, slide valves, valves, pumps, T-sections, reducers and diffusers. Through these disturbance sources, the flow profile is distorted to something other than an axi-symmetrical shape.

Therefore, keep sufficient distance between measuring point and any such disturbance sources.

Only then can we assume that the flow profile in the pipe is fully developed. However, KATflow will give you meaningful measuring results even under non-ideal measuring conditions, i.e. with a liquid containing a certain proportion of gas bubbles and/or solid particles, and if the recommended distances to flow disturbance sources can not be observed to the book for practical reasons.

With careful selection of the measuring point, you should, however, reduce the impact of disturbances sources.

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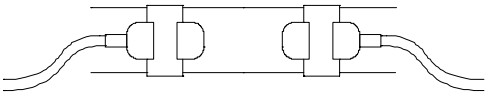
Examples for the Selection of the Measuring Point

Horizontal pipe

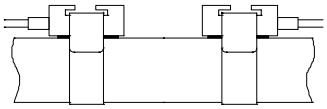
Select the measuring point so that the sound waves from the transducers propagate the pipe horizontally.

(Solid particles are deposited on the bottom of the pipe, gas pockets can develop at the top.)

Correct



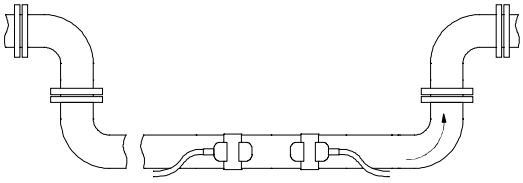
Incorrect



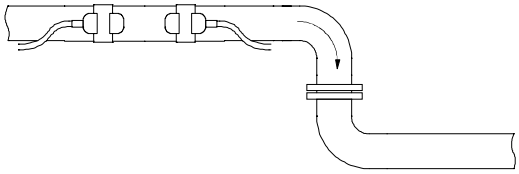
Free inlet or outlet pipe sections

Select the measuring point at a location where the pipe cannot drain out.

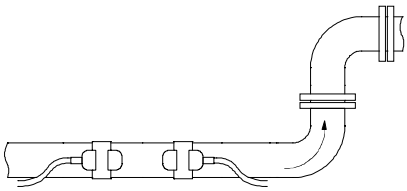
Correct



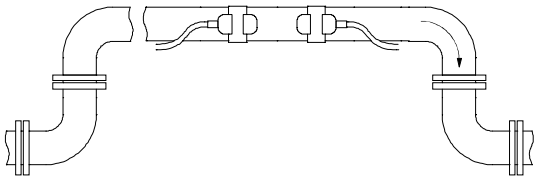
Disadvantageous



Correct



Disadvantageous

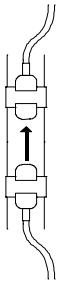


Vertical pipe

Select the measuring point at a location where the liquid flows up.

(Pipe completely filled)

Correct



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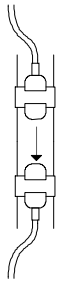

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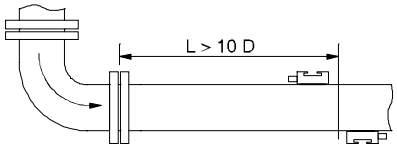
Distances between Measuring Point and Disturbance Source

In the following examples, recommended straight inlet and outlet pipe lengths are given for different types of flow disturbance sources to assist in selecting the correct measuring point.

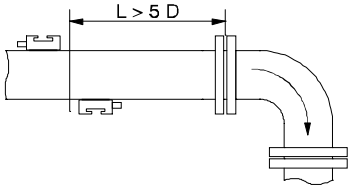
D = Nominal pipe diameter at measuring point
L = Recommended distance

Disturbance source: 90 °-elbow

Inlet
L ≥ 10 D

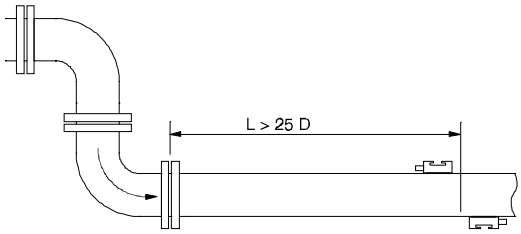


Outlet
L ≥ 5 D

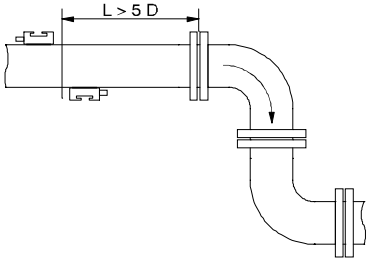


Disturbance source: 2 x 90 °-elbows in one plane

Inlet
L ≥ 25 D

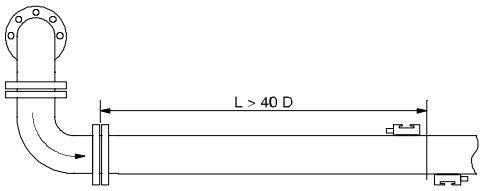


Outlet
L ≥ 5 D

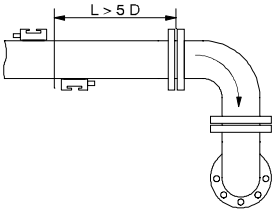


Disturbance source: 2 x 90 °-elbows in different planes

Inlet
L ≥ 40 D

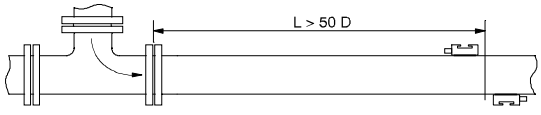


Outlet
L ≥ 5 D

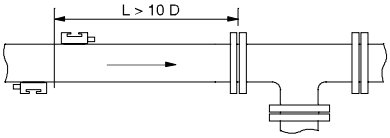


Disturbance source: T-section

Inlet
L ≥ 50 D



Outlet
L ≥ 10 D



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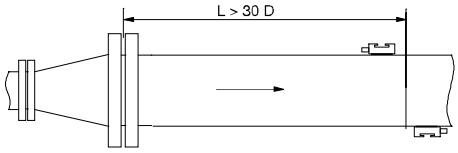
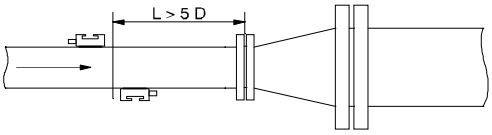
Disturbance source: diffuser

Inlet
L ≥ 30 D

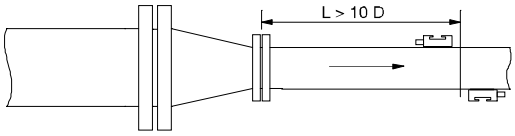


Outlet
L ≥ 5 D

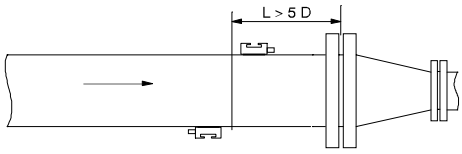


Disturbance source: reducer

Inlet
L ≥ 10 D



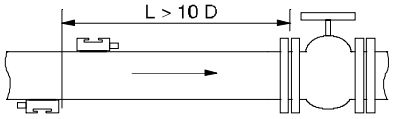
Outlet
L ≥ 5 D



Disturbance source: valve

Inlet
L ≥ 40 D

Outlet
L ≥ 10 D



Disturbance source: pump

Inlet
L ≥ 50 D