



Datasheet 110 - Installation recommendation

For the density and flow sensor it is important that the slurry is very well mixed and that there is good contact between the particles and the sensors. Below table will show the ranking (1 to 5, 1 is the higher ranking) of importance for the installation of the density and flow sensor.

The density sensor needs a turbulent flow, while the flowmeter needs a “laminar” flow. Due to budget reasons we fix them together in one spool piece or wafer cell, but separate mounting would be much better.

When considering mounting both sensors apart from each other, then follow these rules:

- 1) The ultrasonic density probe shall be a full ceramic QP015, as it is in turbulent area.
- 2) The slurry composition at both locations shall be the same, as well as the temperature and massflow.
- 3) The density sensor is mounted upstream, the flow sensor downstream.
- 4) The preferred distance between them is $5xD$, without any obstruction. After the flowmeter, a minimum of $3xD$ shall be clear of any obstruction.
- 5) The cable connection between the transmitters of each sensor is a 2x2 twisted pair cable, readily available at Arenal.

Sensor position	Density Rank	Flow rank
Just after the pump in a vertical section. The slurry is well mixed and has a high pressure *)	1	4
Just after the pump in a horizontal section. Position the sensor at 4:30 o'clock *)	2	5
In the middle of a vertical section. The flow profile and also the slurry concentration at the outside of the pipe will change after a flow change. It means that the density reading will change as well. It is not predictable, but it is reproducible.	3	1
In the middle of a horizontal section. The solids will settle after a few meter. Solids will settle, unless the density is high enough to form a good mixture. Never place the sensor at the bottom or top of the pipe. The best location is 4:30 or 7:30 o'clock. Increase the moving average. Take samples at the same height as the sensor, not from the top or bottom.	4	2
Just before or after a bend or obstruction. The flow and density profile is not predictable. If this position cannot be avoided, place the sensors at the outer part of the pipe at 3 am position.	5	3

*) At this point the slurry is very abrasive: check the insertion of the sensor in the pipe if the pipe is eroding fast. The sensors are made from Sintered Silicon Carbide, the toughest ceramic material on earth and they do not wear when installed correctly. But they can chip off when inserted too much in the slurry (about 5 mm) by the side impact of the solids.

In any installation, make sure first to select the highest ranking for density, then for flow.