OSRAI' Flow : Flow calculation for small diameter sewage collectors (200-250-300 mm)

The autonomous and communicating solution to reliably convert a water height measurement into flow rate

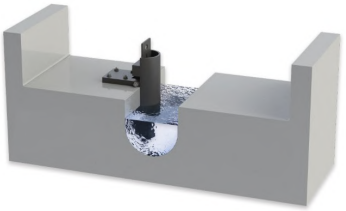
- Simple and quick field installation of a contraction that adapts to site constraints including on existing manhole.
- Non contact measurement of the water height and reduced contraction limiting risk of upstream fouling .
- Flow calculation by the sensor with the measured water heigh, covering a wide range of upstream slopes.

System designed and tested by the I-Cube laboratory of ENGEES and Ijinus within the framework of the OSRAI project.

ENGEES ÉCOLE NATIONALE DU GÉNIE DE L'EAU ET DE L'ENVIRONNEMENT DE STRASBOURG — ICUBE — APEI INNOVATION ASSAINISSEMENT

Presentation & principles of the system

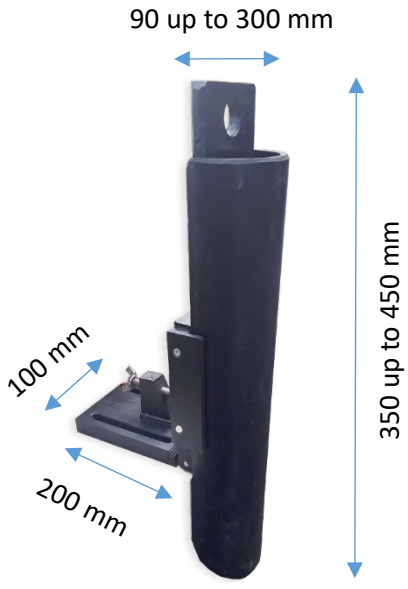
The Osrai'Flow system is based on the principle of the contraction of the flow by an "obstacle" in order to guarantee a hydraulic law between the flow and the water height upstream.
The "semi-circular" shape (view from the top) and only one side of the channel was selected to limit the risk of fouling and be able to settle in an existing manhole.
The size of the obstacle also makes it possible to have reliable flows for upstream slopes up to 4%.
An Ijinus water height sensor allows, with the established laws, to provides the flows and therefore the flow out volume.
Several dimensions of the obstacle are available depending on the pipe diameter, the slope and the minimum and maximum flows.



Battery powered ultrasonic level sensors

- Quick installation, on-site radio connection
- Integrated conversion tables
- Wireless setting with Rfid technology
- Sensor with or without modem for remote monitoring
- Lithium battery powered, low-power consumption
- Rugged, compact, sealing IP68

Ijinus sensors integrate the flow conversion laws of the Osrai'Flow device.



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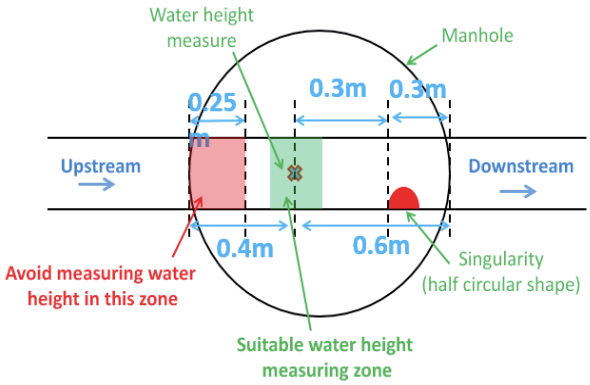
Installation and commissioning

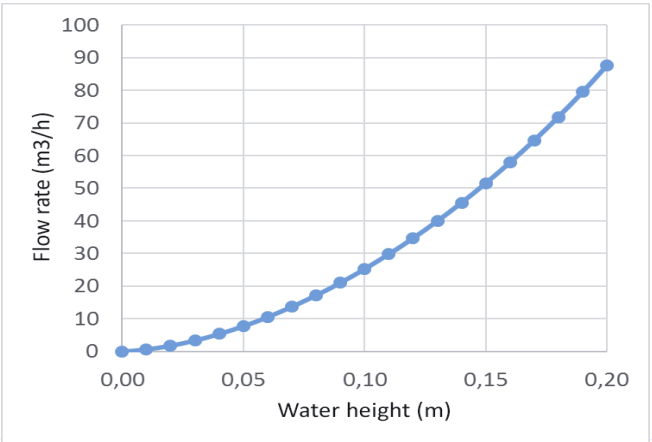
Following review of the site and choosing the obstacle attributes, the installation is as follows:

- Check of the channel diameter, measurement of the height between the invert level and the benching, measurement of the angle of the vertical part of the channel if it is not strictly vertical,
- Positioning the obstacle at 30 cm upstream from the outlet and fixing it with fixing pins after drilling of the benching,
- Adjustment of the device according to the benching slope and the shape of the channel,
- Installation, calibration of the heights of an Ijinus ultrasonic sensor (LNU) about 40 cm from the inlet of the manhole,
- Finally, via the Avelour software, select the right OsraiFlow model characteristics to activate the transformation law in flow.

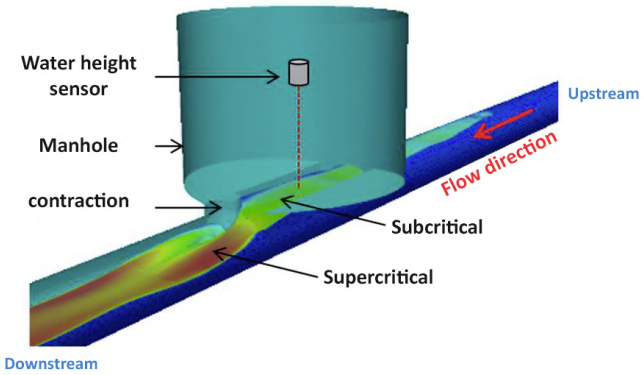
Positioning obstacle system and level sensor for a circular manhole 1000mm diameter



Relationship example between flow and water height for a 200mm diameter pipe and a semicircular shape D = 125mm (vertical)



Development of the laws and their characteristics



As the laws of this shape of contraction did not exist, for each configuration of the device (channel diameter, slope, half-circular diameter of the obstacle, ...), 3D modeling were carried out by the I-Cube laboratory of the ENGEES to establish the relationship between flow and water height.

The given values here are only valid for vertical obstacles and up to a maximum water height equal to the diameter of the pipe. These laws are coded in the Avelour operating software and therefore available in Ijinus water height ultrasonic sensors.

200 mm pipe diameter

Half-circular model (*)	Maximal upstream slope (%)	Q min (m³/h)	Q max (m³/h)
125 mm (reference: OSRAI 125)	1,2	0,3	88
160 mm (reference: OSRAI 160)	2,2	0,2	72

250 mm pipe diameter

Half-circular model (*)	Maximal upstream slope (%)	Q min (m³/h)	Q max (m³/h)
125 mm	0,7	0,6	176
160 mm	1,6	0,4	151
200 mm (reference: OSRAI 200)	3,2	0,2	129

300 mm pipe diameter

Half-circular model (*)	Maximal upstream slope (%)	Q min (m³/h)	Q max (m³/h)
160 mm	1,2	0,7	248
200 mm	2,2	0,4	219
250 mm (reference: OSRAI 250)	3,2	0,2	184

(*) laws only established for obstacles with slopes of 0 up to 10 ° and validated for water height below the height of the channel