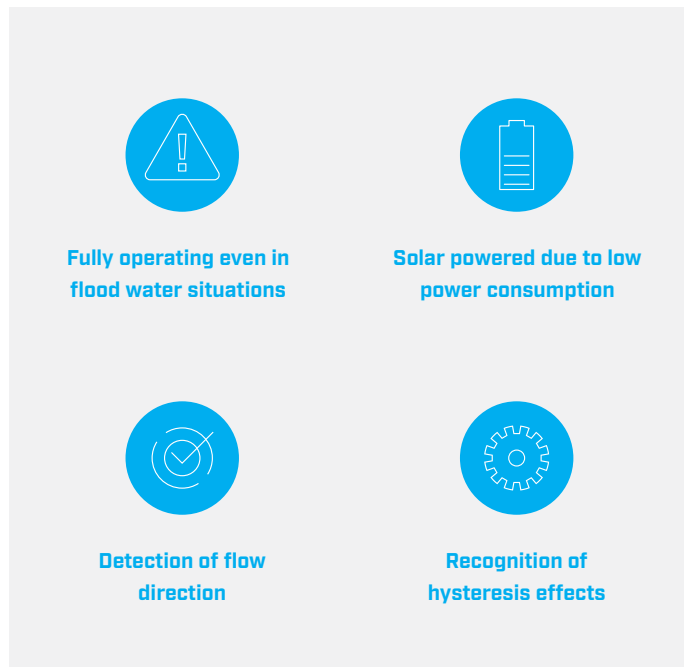
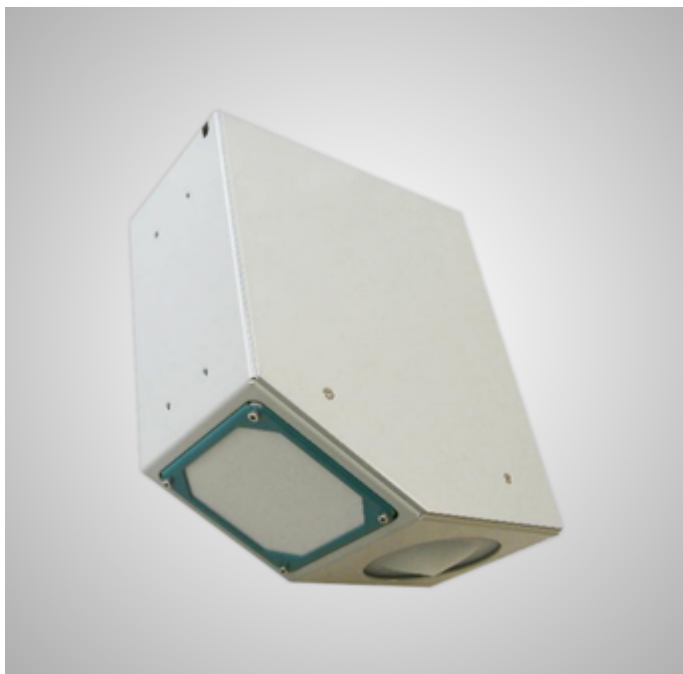


RQ-30

Contact-free discharge radar

The RQ-30 radar sensor continuously measures the discharge of rivers and channels. The device combines two contact-free radar measurement methods to determine the surface velocity and water level.



Because of the contact-free measurement the system cannot be harmed by sediments and floating refuse. The result is very low maintenance and an increased reliability, especially in flood water situations.

Application

Assembly

The sensor can be easily mounted on bridges, super-structures of channels or the ceilings of closed channels. Installation at measurement locations previously too difficult to realize is now possible.

Criteria

The main criteria for measurement sites are the properties of the riverbed, the water surface and the flow conditions. The riverbed must not change to ensure a consistent measurement. The water surface must not be flat. Wavelets should be visible. Stones, maelstroms or standing waves should not occur within the measuring area.

Measurement range

Depending on the properties of the water surface the device can be installed in a height of 0.5 to 35 m. The measurable

velocity range is between 0.10 and 15 m/s. Additionally the direction of flow is detected, enabling the operation in tide influenced rivers.

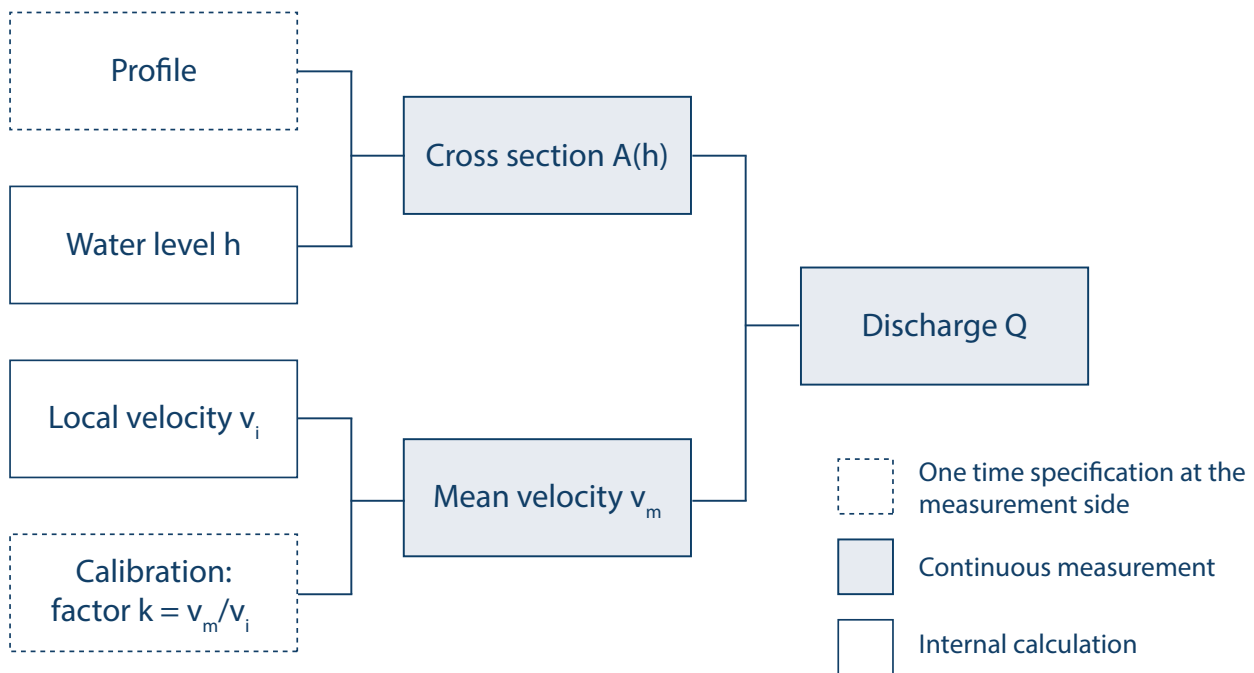
Measurement principle

Flow velocity

The flow velocity is measured using the Doppler effect. A radar signal with a frequency of 24 GHz is transmitted towards the water surface. The signal is partially reflected, the moving water causes a frequency change due to the Doppler effect. A spectral analysis is performed on the reflected signal and the water's surface velocity is calculated. The signal has to be transmitted at an angle to the water surface. This angle is internally measured to automatically correct the calculated velocity.

Water level

The water level is calculated using a time measurement. The radar device sends short pulses perpendicular to the water surface. To conclude the distance to the water surface and thus the water level, the time between transmission and reception of these pulses is measured.



Discharge - The discharge Q is determined by the continuity equation

Technical data

General

Dimension in mm	338 x 333 x 154 mm
2 brackets for pipe with diameter 34 - 48 mm	± 5 m/s default, ± 20 m/s max.
Total weight	5.4 kg
Protection class	IP 67
Power supply	6 to 30 V
Consumption at 12 V	standby approx. 1 mA
active measurement about 140 mA	10 cm min. (automatic selection)
Operation temperature	-35 °C to 60 °C
Storage temperature	-40 °C to 60 °C
Protection	over voltage protection, reverse power protection, lightning protection

Level measurement

Level range	<ul style="list-style-type: none"> 0 to 15 m - standard version 0 to 35 m - extended measuring range (optional)
Resolution	1 mm
Accuracy	+/- 2 mm
Radar frequency	26 GHz (K-Band)
Radar opening angle	10°

Velocity measurement

Detectable measurement range	0.10 to 15 m/s (depending on flow conditions)
Accuracy	+/- 0.01 m/s; +/- 1 % FS

Resolution	1 mm/s
Direction recognition	+/-
Measurement duration	5 to 240 s
Measurement interval	8 s to 5 h
Measurement frequency	24 GHz (K-Band)
Radar opening angle	12°
Distance to water surface	0.50 to 35 m
Necessary minimum wave height	3 mm

Automatical vertical angle compensation

Accuracy	+/- 1°
Resolution	+/- 0.1°

Interface

Analog output (RQ-30a)	4 x outputs 4 - 20 mA for level, velocity, discharge and AUX
Interface	Interface: 1x SDI-12, 1x RS-485 or Modbus Transfer rate: 1.2 to 115.2 kBd Protocol: various ASCII-Protocols Output: discharge, flow velocity, level, quality parameter