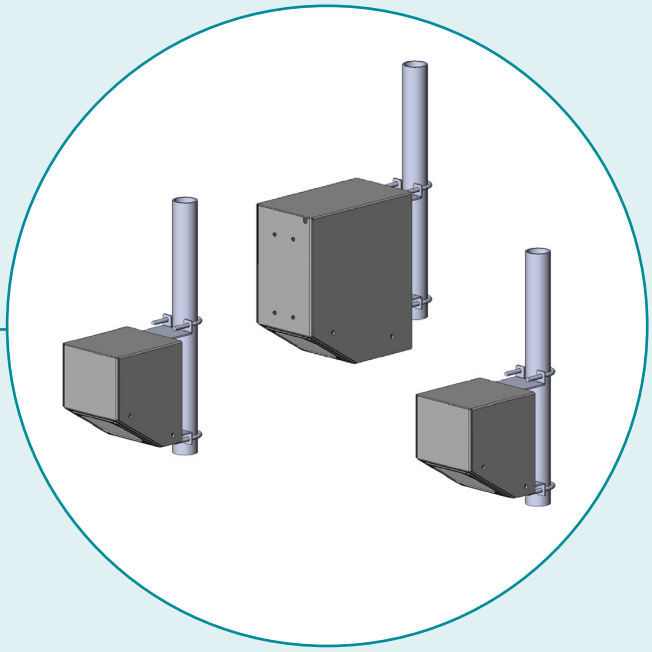
RQ-30d

Reliable, accurate and non-contact discharge measurement especially for wide rivers and streams with inhomogeneous distribution of flow velocity.



Features and advantages

- ✓ Discharge measurement at high accuracy for very broad bodies of water and at inhomogeneous velocity distribution
- ✓ Only one level measurement, but multiple individual velocity measurements
- ✓ Proven SOMMER RQ radar technology: non-contact measuring, maintenance free and flood-proof
- ✓ No structural work is necessary in the water
- ✓ Recognition of flow direction and hysteresis effects
- ✓ Measurement in tidal waters
- ✓ Measurement in backwater situations
- ✓ Measures even where weed growth prevails and in waters with high turbidity
- ✓ Measuring range from +/-0.10 to +/-15 m/s (depending on the flow conditions)
- ✓ Optional: analogue outputs from 4 to 20 mA

EN

General

SOMMER radar technology

The radar sensors of the RQ-series measure continously and contact-free the discharge of rivers, streams, open channels or canals. For that two principles of radar measurement are combinded within the device, one to determine the surface flow velocity and one for the water level. Together with a known cross section profile the sensor can then calculate accurately the discharge Q of the water.

Non-contact = failsafe = low maintenance

Thanks to the non-contact measurement technology it is possible to install the sensor outside the body of water. Hence, the equipment is not susceptible to contamination, debris or driftwood in the water. The user further profits from very low-maintenance operation and increased system reliability, especially in situations of floods.

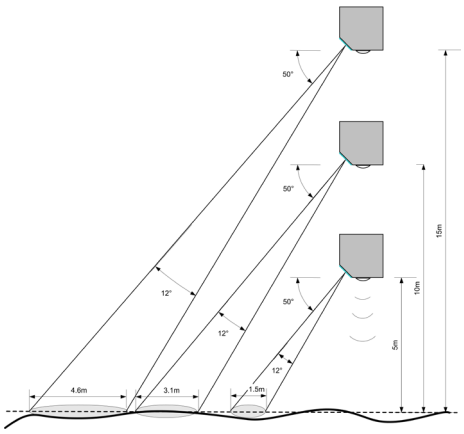
Fields of application

Increased accuracy with the RQ-30d

The main advantage of the RQ-30d is that the discharge can be measured more precisely, especially in rivers and streams where the flow velocity is distributed inhomogeneously over the cross-section. Varying velocities can be observed particularly in very broad streams as well as in situations, where the measuring site is located close to a river bend, an incoming river or watergates. In order to capture the complete flow-profile even more accurately, the RQ-30d system measures multiple individual flow velocities dispersed over the width of the body of water.

Installation and measuring range

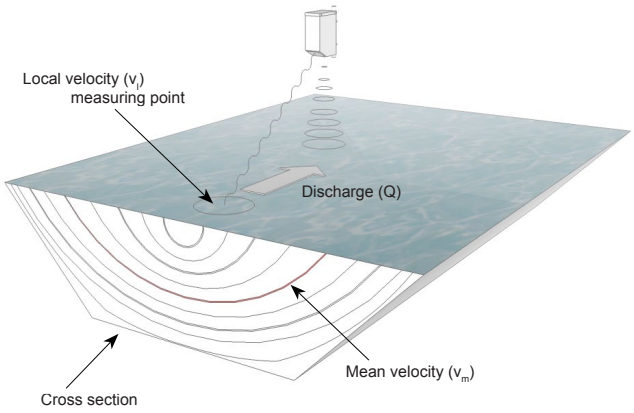
The sensors can be simply mounted on bridges, on the roves of closed canals or at any other superstructure above or accross the body of water. Hence, measuring sites come into consideration that otherwise maybe could not be realised.
The sensor can be installed at a height of 35 meters at the maximum above the water surface. Contrarily, there has to be a minimum distance of 0.5 meter. The measurable flow velocity range is between 0.10 and 15 meters per second. The radar recognises the flow direction therefore measuring in tidal waters is possible, too. Even where weed growth prevails and in waters with high turbidity the sensor delivers reliable results.



Measuring principle

Surface flow velocity

The measurement of the surface flow velocity is based on the Doppler frequency shift method: A radar signal is transmitted to the water surface at a constant frequency of 24 GHz. The sensor measures the partially reflected signal whose frequency is shifted due to the water movement. The surface velocity is determined through a spectral analysis. With a hydraulic model the sensor converts the surface velocity into the relevant mean velocity which is needed for the discharge calculations.

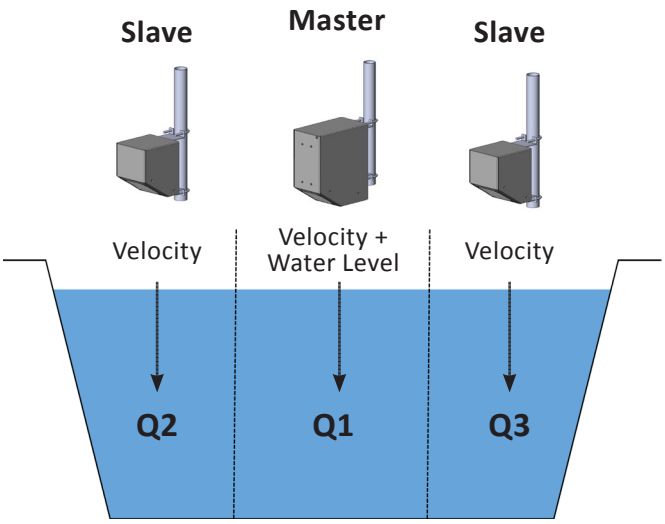


Water level

The water level is determined using a travel time measurement. Here the radar device sends short impulses perpendicular to the water surface. The distance to the water surface and yet the corresponding actual water level can be calculated by measuring the time interval from the emission to the reception of the reflected impulses.

One water level, multiple velocities

For the RQ-30d (in comparison to the RQ-30) the measuring principle was enhanced: Here the river is split into multiple sections and from each one a partial velocity measurement is taken. One sensor, the master device, additionally measures the water level and distributes this information to all the other devices (= slaves) in the system. Now they are able to calculate the partial dicharge rate per section. Summing up all partial amounts of discharge results in the total discharge at the actual site – continously, with non-contact to the water and with increased accuracy. The RQ-30d system can be operated with up to seven slave devices at the maximum.



Criteria for the measuring site

The most important criteria for the measuring site of the RQ-30d are the nature of the riverbed, the water surface and the current conditions.

The bed of the water should be as stable as possible in order to warrant consistent measurements. The water surface must not be completely still (plain). However, the sensor is very sensitive and receives reflections from ripples of only 3mm. Rocks, wirlpools, steps or stagnant waves within the measuring spot have to be avoided if possible.

Technical details

General	
Dimensions (mm)	master: 338 x 333 x 154 | slave: 175 x 154 x 246 2 brackets per device for pipe diameter of of Ø 34 – 48 mm
Total weight	master: 5.4 kg | slave: 2.7 kg
Material	aluminium housing, powder coated
Protection	IP 67
Power supply	6 ... 30 V
Power consumption per device (at 12 V)	standby approx. 1 mA active operation approx. 140 mA
Operating temperature	- 35° ... 60° C
Storage temperature	- 40° ... 60° C
Lightning protection	integrated lightning protection

Water level measurement (only slave device)	
Water level	0 ... 15 m - standard version 0 ... 35 m - extended measurement range (optional)
Accuracy	+/- 2 mm
Resolution	1 mm
Radar frequency	26 GHz (K-Band)
Radar opening angle	10°

Surface velocity measurement	
Measurable range	0.10 ... 15 m/s (depending on the flow conditions)
Accuracy	+/- 0.01 m/s; +/- 1 % FS
Resolution	1 mm/s
Recognition of direction	+/-
Measurement time	5 ... 240 sec.
Measurement interval	8 sec. ... 5 hrs
Measurement frequency	24 GHz (K-Band)
Radar opening angle	12°
Distance to water surface	0.50 ... 35 m
Necessary minimum wave height	3 mm

Automatical vertical angle compensation	
Accuracy	+/- 1°
Resolution	+/- 0.1°

Interface		
	Interface:	1x SDI-12 1x RS 485, Modbus
	Transfer rate:	1.2 to 19.2 kBd
	Protocol:	various ASCII-protocols,
	Output:	discharge rate, flow velocity, water level, quality parameters

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