Non-Contact Discharge Radar RQ-30 / RQ-30a

Non-contact discharge measurement by means of radar technology for open rivers

The RQ-30 is a sensor for continuous discharge measurement of rivers, open channels and canals with known cross-section profile. The sensor uses innovative radar technology to measure velocity, water level and discharge. It enables reliable, non-contact measurement without the need for structural work in the water.

Features and advantages

- Non-contact, maintenance free measurement system
- No structural work is necessary in the water
- No threat to the system through flooding
- Low power consumption enables operation using solar cells
- Recognition of flow direction
- Measuring range 0.08 ... 16 m/s(depending on the flow conditions)
- Recognition of hysteresis-effects
- Measurement in backwater situations
- Measures even where weed growth prevails and sensor is not affected by turbidity
- Measurement in tidal waters
- Automatic angle measurement
- Optional (RQ-30a): analogue outputs from 4 to 20 mA

Fields of application

The RQ-30 enables discharge measuerment for rivers, streams, open channels and canals for which continuous monitoring is desired. Thanks to the non-contact radar technology the measuring equipment is not susceptible to contamination, debris or driftwood in the water. Furthermore, the non-contact measurement warrants very low maintenance and fail-safe operation especially during high water or flooding.

Implementation

The sensor can be simply mounted on bridges, on the roofs of closed canals or channel superstructures. The bed of the water should be as stable as possible in order to warrant consistent measurement. A visible swell must be evident on the

surface of the water.

Measuring principle

The non-contact radar technology determines the water surface flow velocity using the Doppler frequency shift method and furthermore the water level is established by a travel time measurement. With known cross section profile the discharge Q of the water can then be calculated on basis of the continuity equation: $Q = v_m \cdot A(h)$

Technical details

General

- **Dimensions** 338 mm x 333 mm x 154 mm
- **Total weight** 5.4 kg
- **Protection class** IP 67
- **Power supply** 6 ... 30 V
- **Power consumption at 12V** standby approx. 1mA; active operation approx. 140mA
- **Operating temperature** -35 ... 60°C
- **Miscellaneous** over voltage protection, reverse power protection, lightning protection

Waterlevel measurement

- **Measurement range** 0 ... 15 m standard version / 0 ... 35 m extended version
- **Resolution** 1 mm
- **Radar frequency** 26 GHz (K-Band)
- **Radar opening angle** 10°

Velocity measurement

- **Measurement range** 0.08 ... 16 m/s (depending on flow conditions)
- **Accuracy** +/- 0.01 m/s; +/- 1 % FS
- **Resolution** 1 mm/s
- **Direction recognition** +/-
- **Measurement duration** 5 ... 240 sec.
- **Measurement interval** 8 sec. ... 5h
- **Measurement frequency** 24 GHz (K-Band)
- **Radar opening angle** 12°
- **Distance to water surface** 0.50 ... 35 m
- **Necessary minimum wave height** 3 mm

Automatic vertical angle compensation

- **Accuracy** +/- 1°
- **Resolution** +/- 0.1°

Interface

- **Analogue Output (RQ-30a)** 4 x output 4 - 20 mA for water level, velocity, discharge and AUX
- **Digital Interface** 1 x SDI-12; 1 x RS 485 or Modbus
  - Transfer rate: 1.2 to 115.2 kBd
  - Protocol: various ASCII-protocols
  - Output: water level, velocity and discharge, quality parameters