

SQ-Series

Non-contact discharge measurement
for wastewater, sewage systems and
industrial waters



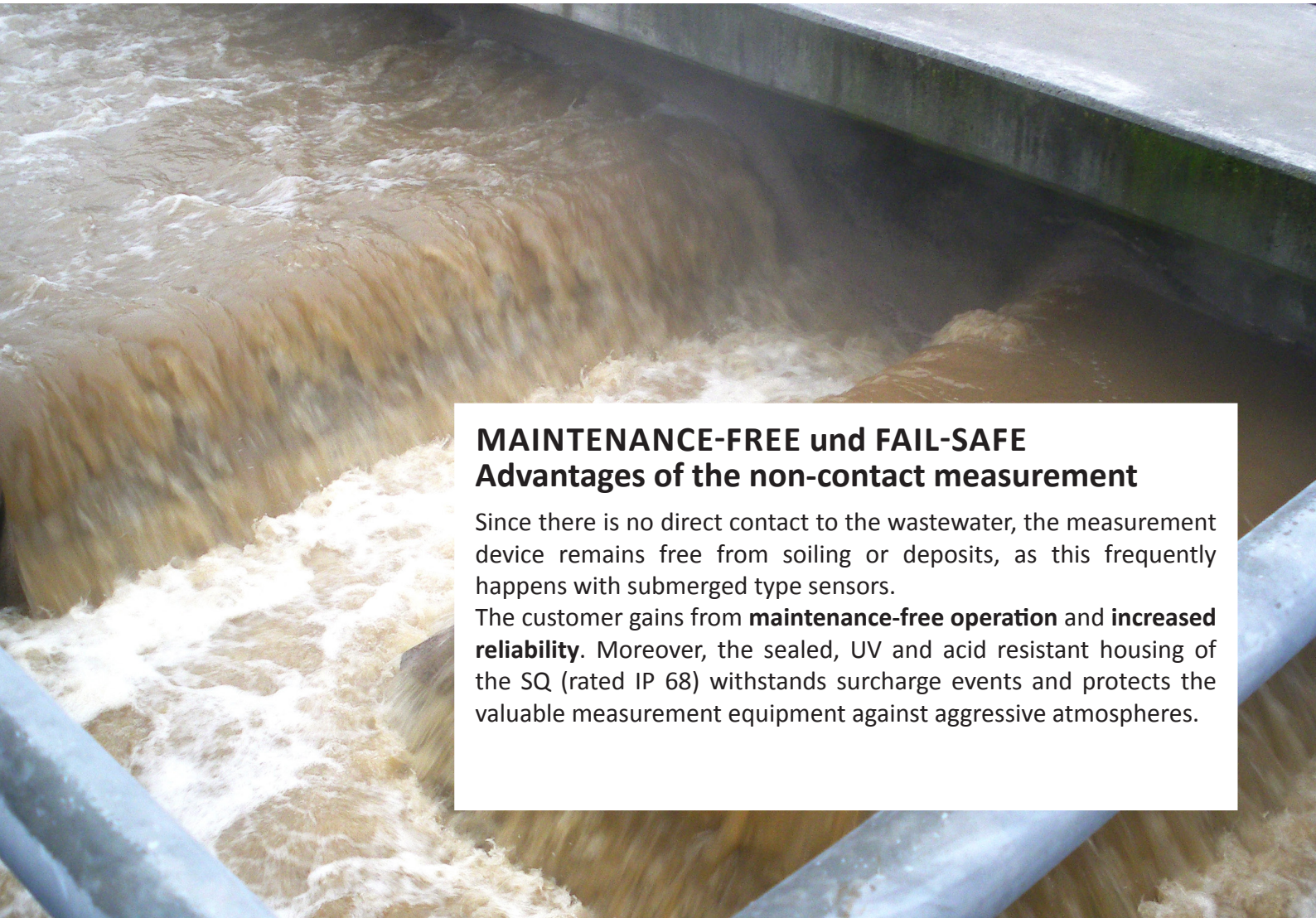
Non-contact monitoring

Innovative radar measurement technology as key

The flow meters of the SQ-series capture continuously and contact-free the flow rate of sewer systems, ducts, semi-filled pipes and other technical channels in the fields of wastewater and industrial effluents.

The discharge calculation of the sensor, which is very easy to install and to set up, is based on a hydraulic model. Non-contact level and flow velocity measurement is achieved using up-to-date radar technology, whereby the level is measured by means of ultrasonic or alternatively by radar technology.

The series consists of the different types SQ-3, SQ-6 and SQ-15 according to the level to be measured.



MAINTENANCE-FREE und FAIL-SAFE **Advantages of the non-contact measurement**

Since there is no direct contact to the wastewater, the measurement device remains free from soiling or deposits, as this frequently happens with submerged type sensors.

The customer gains from **maintenance-free operation** and **increased reliability**. Moreover, the sealed, UV and acid resistant housing of the SQ (rated IP 68) withstands surcharge events and protects the valuable measurement equipment against aggressive atmospheres.

Measuring principle

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. Finally, the mean velocity results by applying an integrated hydraulic model and is used for the calculation of the discharge (flow rate).

Discharge

The discharge Q is determined by the continuity equation.

$$Q = v_m \cdot A(h)$$

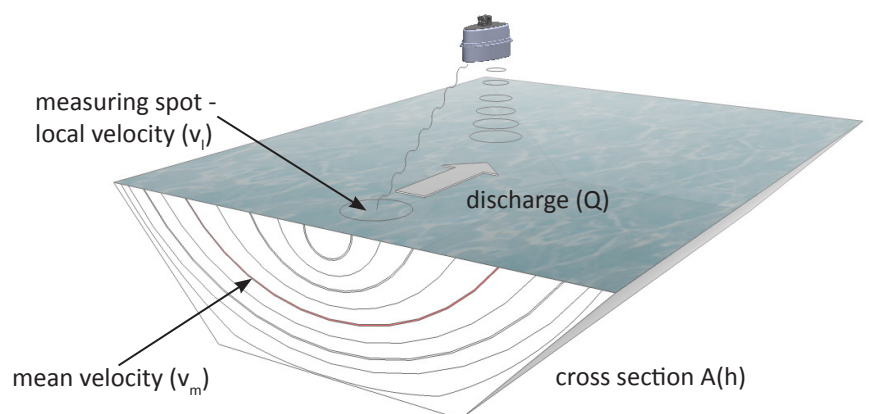
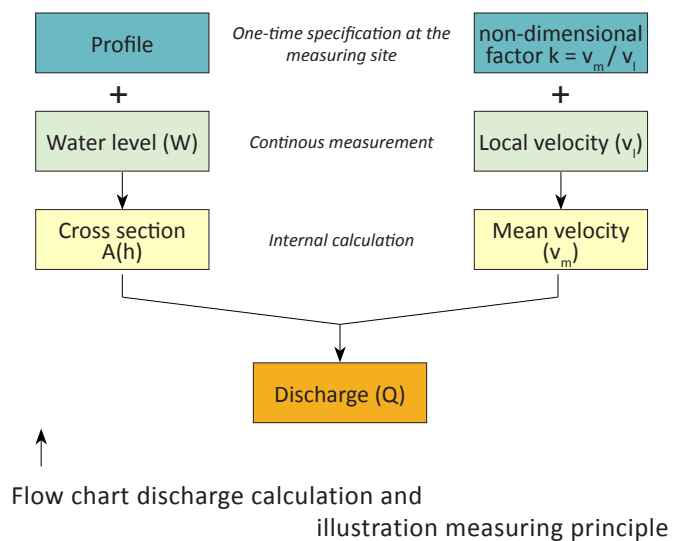
Based on the cross-section profile at the measuring site the wetted cross-sectional area $A(h)$ is determined depending on the water level. According to the hydraulic calculation the mean velocity v_m results from the local surface velocity v_l measured by the SQ sensor.

Hence, the discharge can be determined and outputted directly from the flow velocity and the water level. All this is done by the specifically developed and intelligent sensor software **Q-Commander**.

Level

The water level is calculated using a travel time measurement. The device sends short pulses 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.

Optionally and according to individual requirements the level measurement can be done by an ultrasonic or a radar sensor. If there is considerable foam on the surface the radar delivers more reliable results.

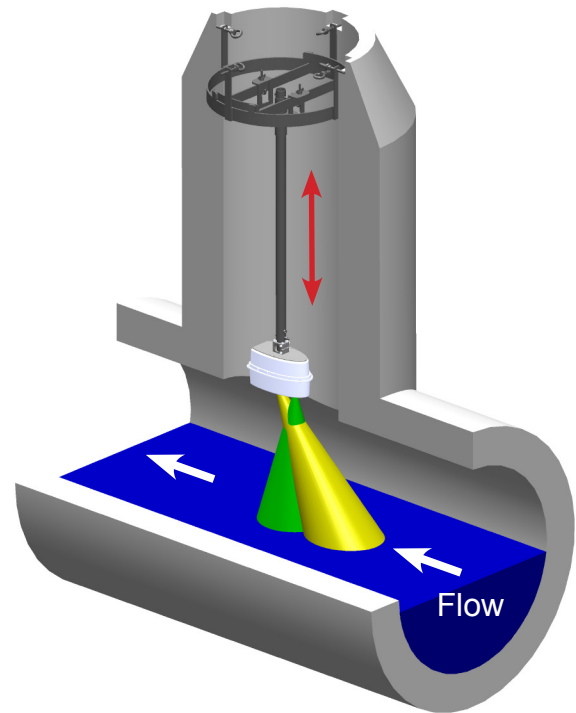


SQ in sewage systems

Discharge measurement and sewer monitoring

Monitoring flow rates

Accurate monitoring of their discharge rates is a major interest of municipalities, local authorities, sewage boards and operators of big sewer systems. Planning, allocation of costs and operation of the sewage network essentially depend on these data as well as the professional management of storm-water events. For this reason continuous and reliable measurements at key spots in the system or at storm-water overflow basins are a must. The contact-free measuring flow meters of the SQ-series perfectly fulfil these requirements: Non-contact monitoring, therefore maintenance-free operation and uninterrupted, reliable measurement data through our innovative radar technology.



- › Application in aggressive environments possible
- › Water-proof, tight housing
- › Higher safety for staff and equipment
- › Monitoring of very little discharge rates possible, since the sensor measures from above.



Increased safety during installation and maintenance

Thanks to the convenient mounting bracket the installation of the SQ flow meter in the sewer can be done quickly and simple and even without the need to enter the manhole. This results in increased safety for your staff and easier access to the sensor.

Variable mounting bracket for differing diameters and installation depths

SQ in sewage treatment plants

In- and outlet monitoring, storm-water overflows

Modern facility management

The amount of water entering a sewage treatment plant is considered to be a key parameter. The continuous measurement of the flow rates is very important to guarantee smooth and effective operation. Regulation and control of the plant and its processes (as for example the proper functioning of the aeration basins) essentially depends on the current volume rates.

With its non-contact measurement technology the SQ flow meter is particularly advantageous for applications in wastewater with high turbidity and solid contents. Therefore the SQ ideally meets the needs and requirements of wastewater treatment plants.



- › Accurate flow measurement also with high turbidity or solid contents in the wastewater
- › Discharge values as basis for cost accounting
 - › Dimensioning and control of plant and processes
- › Discharge monitoring for (re)adjustment of calculation models

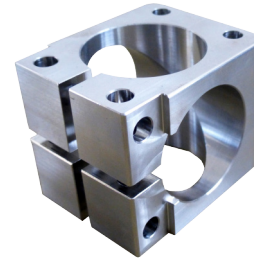


SQ in technical channels

Process water, shafts, semi-filled pipes etc.

Broad field of application

The SQ can be used for various different applications due to its compact design, its housing, which is water-proof and resistant against aggressive liquids, and its convenient and simple installation solutions. Open channels, semi-filled pipes, shafts, ducts and other technical bodies of water are possible applications for the measurement of process, waste and industrial water with the SQ.



Mounting cube: vertical / horizontal variable fixation



- › No construction in the water
- › Simple installation and integration in existing monitoring and control systems
- › Data output via multiple interfaces: SDI-12, RS 485, Modbus, analog (4 ... 20 mA), pulse signal
- › Optional: non-contact measurement of water surface temperature

Measuring range of the SQ

The mounting height above the lowest water level and hence the maximum measurement range for the level equals to 3, 6 or 15 meters (depending on the sensor serial type). The measurement range for the flow velocity is between 0,10 and 15 m/s. An accurate discharge measurement is even possible despite high turbidity or solid contents in the water which commonly is the case in sewage.

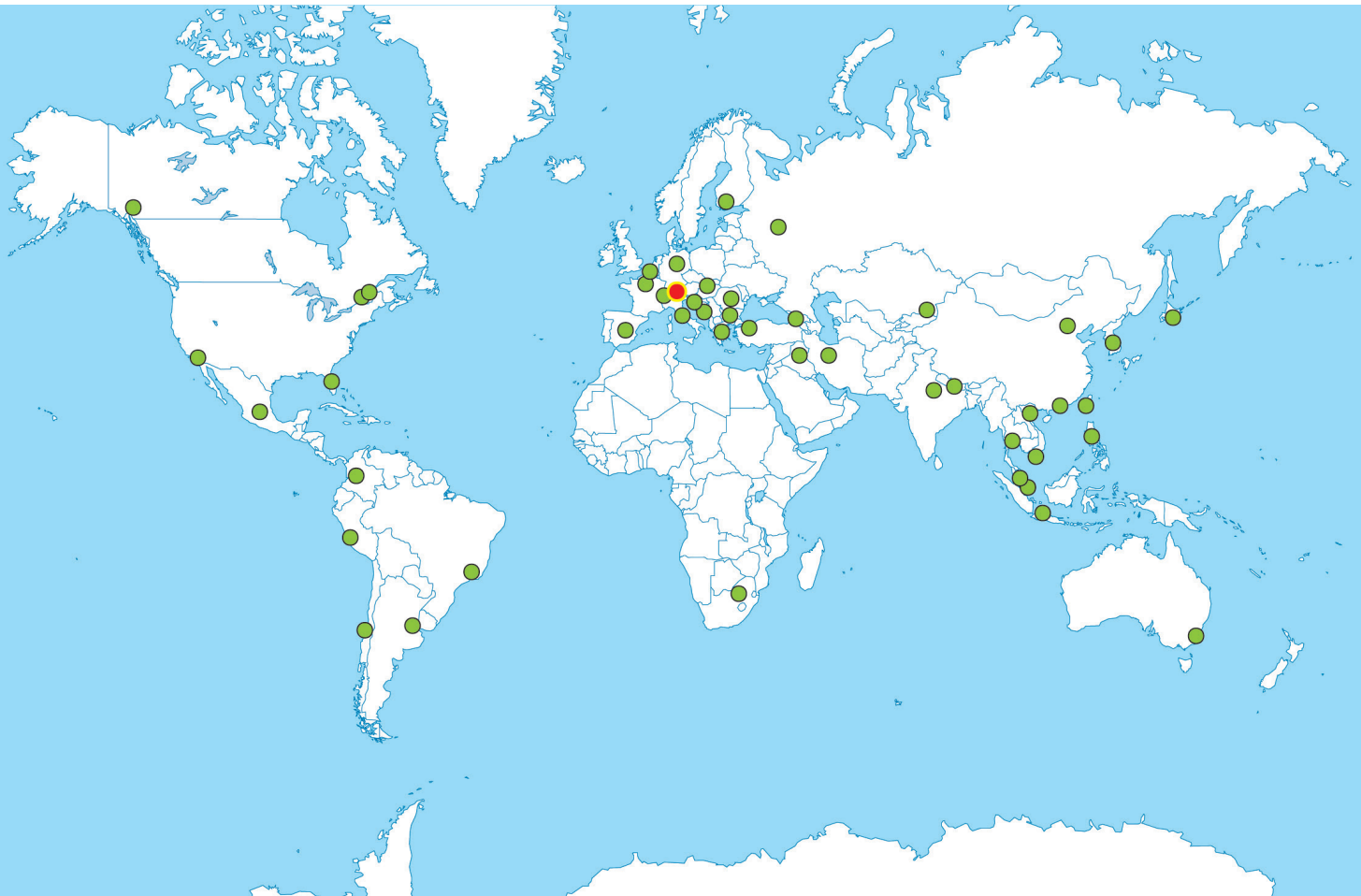


Technical details

General			
Dimensions (mm)	276 x 148 x 143 mm 1 bracket for pipe with \varnothing 30 mm		
Total weight	1.55 kg		
Protection	IP 68		
Power supply	6 ... 30 V		
Consumption at 12 V	standby approx. 1 mA / active measurement approx. 175 mA		
Operation temperature	-35° ... 60° C		
Storage temperature	-40° ... 60° C		
Lightning Protection	integrated lightning protection		
Level measurement			
Serial type	SQ-3	SQ-6	SQ-15
Measuring technology	ultrasonic	ultrasonic	radar
Level range	0 ... 3 m	0 ... 6 m	0 ... 15 m
Resolution	2 mm		
Accuracy	+/- 0.25 % FS	+/- 0.25 % FS	+/- 2mm
Frequency			26 GHz (K-Band)
Opening angle	15°	12°	10°
Velocity measurement			
Detectable measurement range	0.10 ... 15 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. ... 5 hrs		
Measurement frequency	24 GHz (K-Band)		
Radar opening angle	12°		
Distance to water surface	0.10 ... 35.0 m		
Necessary minimum wave height	3 mm		
Automatical vertical angle compensation			
Accuracy	+/- 1°		
Resolution	+/- 0.1°		
Interface			
Analog output (SQ-analog)	2 x 4 ... 20 mA (for level and discharge)		
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: discharge, flow velocity, level, quality parameters		
Pulse signal	Quantity per pulse adjustable		

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