

# Solid AT

## Level Measurement Solutions for the Water and Waste Water Industry

Non-Contact Ultrasonic, Continuous Level and Open  
Channel Flow Measurement

### *As water and waste water* treatment plants

grow in size and complexity, so does the need for control equipment that will handle the operations of the plant.

Furthermore, there is a growing need to maintain a higher level of environmental control and supervision by both municipalities and governmental organizations.

Operation managers and maintenance engineers working in water and waste water sites are seeking instant results and a high level of accuracy in managing sludge, clarifiers and open channels.

Ultrasonic technology is considered the traditional non contact method of level measurement in the water and wastewater industries treatment. The non contact measurement requires low maintenance, hence offering a long lasting and cost effective solution.

*Solid AT's* line of ultrasonic non-contact transducers is tailored to meet these demands, providing solutions for various applications in water and waste water sites. These solutions are fast and easy to install and deliver continuous and accurate level and open channel flow readings.



*You Can Measure the Solid Benefits*

# Monitoring Fluid Levels in Sewers and Clarifiers

## → Preventing Overflow Saving Costs

Sewer cement pools are usually installed underground, 3-12 meters deep and contain pipes, pumps and other obstacles that can cause acoustic noises. The environment inside the pool is highly corrosive and often contains gas and foam. In rainy weather or in strong sludge streams, the surface of the fluids inside the pools may alter rapidly, causing the surface level of the fluid to rise above a certain limit. As mentioned, the pools contain pumps for emptying the contents of the pool. A rise in the surface of the fluid will activate the first pump, to relieve the overflow in the pool. If the fluid level continues to rise, a second pump will start working to supplement the first. If these two cannot cope with the flow, an overflow alarm will be activated.

Wastewater treatment plant operators use equipment to remove harmful industrial and domestic pollution from wastewater. Waste materials are transported by water through sewer pipes to treatment plants.

Together with engineers, scientists and technicians treatment operators are responsible for meeting federal and state water quality standards. Efforts to ensure clean water supplies through federal regulations have increased demands to develop "high tech" systems for treatment plants.

Waste-water conveyed from the city's sewers runs through a series of pipes entering the waste-water treatment plant. The pre-treatment stage includes streaming of the waste water through open channels equipped with various types of filters to screen large solids from the water and which are then poured into settling tanks before proceeding to the clarifiers. After separating the liquid from the sludge, the water is streamed through channels to the clarifiers. Accurate measurement of the water level in the clarifier's tanks is essential for the plant to control and obtain the process intact.

Once the sludge enters the clarifiers there is a need to maintain a close watch on the water level in the tanks in order to control the process and prevent the addition of too much oxygen into the sludge which may cause a low level of bacteria to develop in the aeration tanks.



# Monitoring Fluid Levels in Sewers and Clarifiers

## → **SmartScan 50L** The ideal solution

The SmartScan 50L is the ideal solution for non-contacting measurement of water level in sewers pools. It delivers accurate data while automatically compensating for changes in temperature and other environmental conditions such as: corrosive environment, methane (CH<sub>4</sub>) gas, foam, and solids in sludge.

The SmartScan 50L includes two components: electronics and transducer, thereby enabling the transducer and electronics to be located separately – the transducer inside the sewer, with the electronics in a control room or above the pool.

→ The SmartScan 50L carries a highly sensitive 50KHz transducer made of glass-reinforced epoxy, designed to cope with harsh environment containing gas and foam. The SmartScan 50L has measuring range of up to 12 meters (39 ft.), and can detect changes in fluid level in real time. The data then generated on the 4-20mA current enables operators to control the fluid level in the sewer and prevent it from overflowing. The SmartScan 50L has 5 independent SPDT relays that can control the pumps in the pool and any other alerting device (such as an alarm

The SmartScan 50L can scan and memorize different types of interference signals, thereby overcoming obstacles such as ladders, pipes and pumps that might impede accurate level readings. By virtue of its sealed IP67 sensor the SmartScan is protected in the event of water overflow in the pool.

### Features & Benefits

- 4-Wire
- 4-20mA
- RS232/RS485 communication
- 5 independent SPDT relays for pump and alarm control (on/off programming)
- 50 KHz sensor
- Accuracy of 0.2% of measuring range
- Resolution: 1 mm (0.04 inch)
- Sensor's operating temp': -40°C to 100°C (-40°F to 212°F)
- Graphic LCD display
- Mounting options: 1"NPT/1"BSP
- Wall mount  
/Panel mount





# Accurate Open Channel Flow Measurement of Water and Waste Water

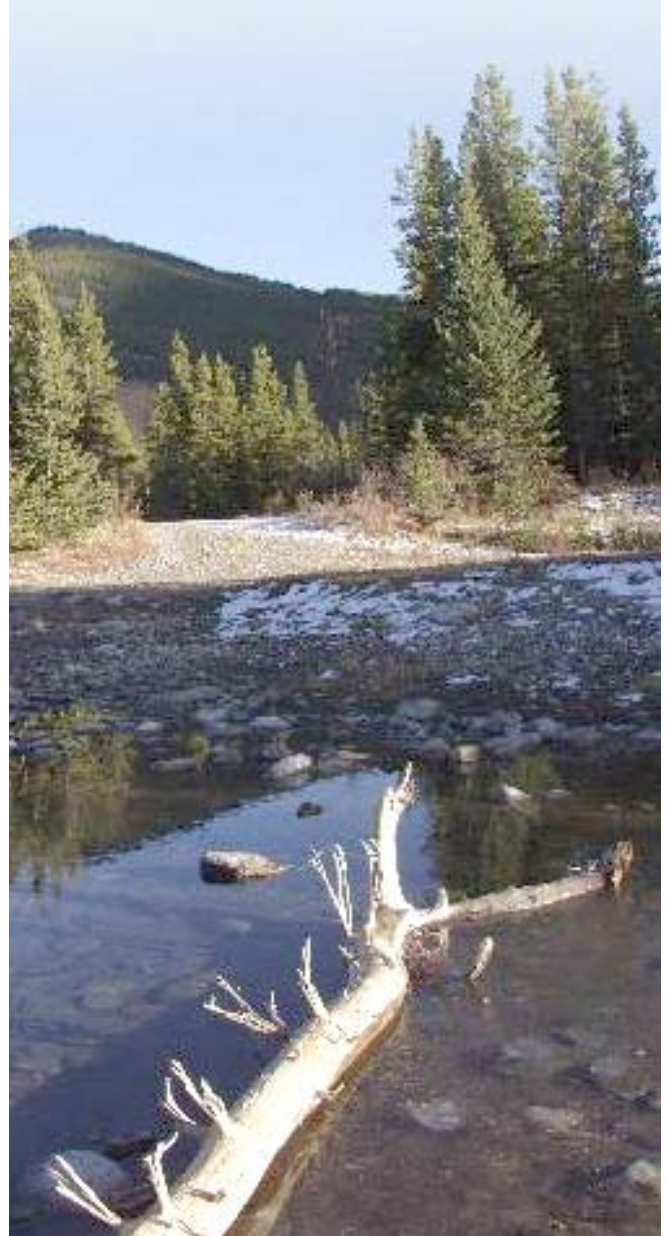


Monitoring of flow helps planners and engineers to properly assess requirements and design systems of the right capacity or production. In open channel flow measurement, weirs and flumes are used to produce known and repeatable characteristics in the process stream. Weirs, flumes and other devices develop a liquid head that is used to measure flow rate. By measuring the time from transmission of an ultrasonic pulse to receipt of an echo, the water level or "Head" is accurately measured.

These devices are particularly useful when large flows are to be measured or where liquids are handled in open channels or in pipelines that are not ordinarily full. Open channel flow is also useful for accumulative measurement of large amounts of waste water and sewage stream. In food and beverage plants, where clean water is an important factor of the production, there is a need to measure the post-production waste water to evaluate their cost. Municipalities and waste water treatment plants also require an accurate measurement of the water flow in order to settle their accounts.

The simplest and most economical flow-measuring devices available are weirs. Basically, weirs are obstructions or dams placed across the channel containing openings or apertures of known geometry through which flows the liquid to be monitored. Weirs may be rectangular, trapezoidal (Cippoletti), "V" notch or a combination of these types. Head is measured as the rise in level of liquid in the pool upstream of the weir. Ultrasonic level instruments are commonly used to measure the rise in head. The use of a stilling well should be considered if foaming or excessive turbulence is encountered.

Slightly more complex devices are flumes that use complex geometries to form the process stream into a controlled flow that allows accurate and repeatable measurement over the range of the flume. The loss of head through a flume is about one-quarter that of a weir of equal capacity.



# Accurate Open Channel Flow Measurement of Water and Waste Water

## → MonoScan O

### The smallest ultrasonic solution for open channel flow measurement

Solid AT's MonoScan O is the smallest open channel flow gauging device in the industry. The MonoScan O is designed to work in wetted environments and therefore made of a water proofed enclosure. Its UV protected mono-block body includes both electronics and transducer designed for various types of environments.

→ The MonoScan O has 9 different types of flumes/weirs predefined in its memory. It measures the water level in the selected tunnel and then translates the readings to flow and displays them on its LCD screen in GPM or M<sup>3</sup>/Hr. Its loop-powered 4-20mA configuration can provide measurement readings to a remote PLC or locally on its LCD.

### Features & Benefits

- Economical
- 2-wire
- 4-20mA output
- Preprogrammed different types of flumes and weirs
- Simple to install and operate
- Zero calibration and maintenance
- EX Approved

#### Also available in MonoScan485™:

- AC/DC supply
- 3 independent SPDT relays
- RS485-Modbus communication



## SmartScan 50 O

### Simplifies Water Flow Calculations

The SmartScan 50 O is based on an electronic unit and highly sensitive transducer with 0.2% accuracy. It supplies 9 different types of flumes and weirs preprogrammed in its memory, and a customization option that allows insertion of up to 24 linear points of customized flume dimensions. The SmartScan 50 O measures the level of water in the channel and converts it into flow which is then displayed on its LCD screen in GPM or M<sup>3</sup>/Hr units. Every cubic meter of water recovered as a result of improving water measurement produces more revenue than the same amount obtained from a new source.

→ To simplify the process of waste water flow calculation between municipalities and waste water treatment plants the SmartScan 50 O provides a totalization function. This function is an accurate measurement tool that presents calculation of accumulated readings of clean water and waste water flow over time.

Its compact transducer of glass-reinforced epoxy allows installations in corrosive and gassy surroundings. The flow readings can be transferred digitally via RS 485 communication and analogically through 4-20mA.

### Features & Benefits

- 9 types of pre-defined flumes and weirs
- Custom flume option (up to 24 linear points)
- Total flow calculation (accumulated)
- 5 independent SPDT relays (internal PLC)
- RS485/RS232 communication
- IP67 rating



# Watching Over Natural Waters in Rivers, Ponds and Lakes

## → Monitoring level differences

Hydro-power stations can prevent an uncontrolled spillover of water from lakes and rivers, by operating dams' gates constructed along the lake/river.

These dams are used for backing up the water from the river/lake into the reservoir. When water is allowed to pass through the station's pump-house, the station generators can produce a considerable amount of megawatts for local electricity consumption.

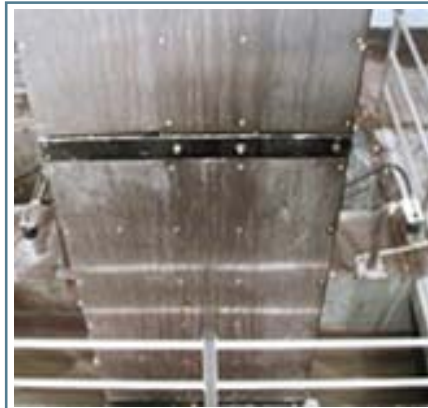
Projected water flow released from the dam and projected lake levels are provided as a service to area residents and those who use the lake and river for recreation.

This data also includes level-differences measurement of the various dams positioned along the river. It is important for the station to obtain such data in order to know if there is any water debris that is blocking these dams and preventing the continuous water flow. When such scenario occurs the fillers located before the dam are rotated automatically to release the blockage and allow the water to run freely

### Features & Benefits

- Field proven
- Reliable and accurate results
- Easy configuration and set-up
- World-wide installations

→ **The SmartScan 50L multi-sensors model with two sensors is designed especially for this purpose. Encompassing two-sensors attached to one electronic unit, the SmartScan displays a single value for the level difference between the two dams' locations. The 4-20mA indicates the level differences between the two sensors, thus updating the hydro-power station about the dams' status. When the level difference reaches a predefined point the dams' filters are activated automatically to permit smooth streaming of the river's water.**





# Watching Over Natural Waters in Rivers, Ponds and Lakes

## → Measuring turbulent water surfaces

Cities located close to tidal areas suffer from rapid changes in the water level. As a solution some of these places create an artificial pond to enable leisure activities and yachts sailing. For their inhabitants it is most essential to maintain an adequate water level in the pond. Electrical gates are usually used in these places as dams to retain the needed water level 24/7. Since these gates are opened and closed according to the tidal level it is necessary to supply them with this information accurately and continuously.

### Features & Benefits

- Low cost
- Resolves turbulent water surface measurement
- Easy and fast installation
- Installation in pipes supported
- Field proven

→ **The MonoScan L is a compact and accurate solution for measuring wavelet water surface. To cope with the altering nature of the water level, the MonoScan L can be positioned inside a pipe vertical to the water surface.**

Measuring through pipes enables the MonoScan to evaluate the exact water level without any disturbances. The MonoScan has a sophisticated algorithm that tracks noises and obstacles, memorizes and stores them to provide compensation in future scanning. Moreover, the MonoScan L is capable of measuring up to 15 meters (49 ft.), which means that the pipe can reach the same length as the maximum measuring range of the MonoScan. Its mono-block design encompassing both sensor and electronics in a single body makes the MonoScan's installation very fast and easy. Furthermore, the MonoScan can be connected to a PLC via 4-20mA current, to allow control over the electrical gates.

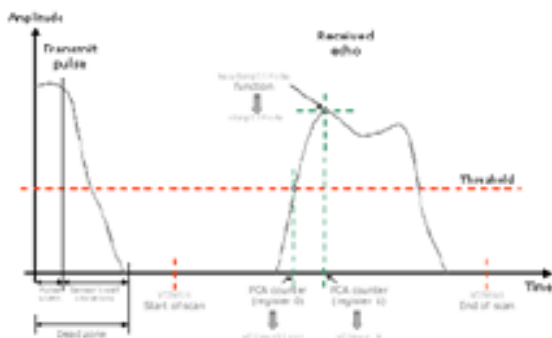


## → Solid patented technology

Solid's patented technology is based on the following two major principles: comparing and analyzing input echoes and determining output parameters. The technology is based on relatively low energy, about 10x less than used so far. The method used presently is to measure (sample) the first echo, which passes the threshold barrier, which in some cases may not give a sufficiently accurate result. Our technology samples the whole amplitude range, and only then establishes the highest amplitude of the range. When the "gain" adjusts itself automatically, according to the received power in the input, the amplitude varies accordingly. In the input, the amplitude sampled before may have now fallen beneath the threshold and will not be taken into account.

### Benefits

- Software control of the amount of pulses, their frequency, gain and transmitted power
- Low Energy
- Greater sensitivity and better response to weak echoes
- Light/small equipment
- Simple and fast installation



## → Simplifying configuration using Solid's PC software

Solid Software provides a simple and fast way to configure, monitor and diagnose most of Solid ultrasonic products using desktop PC or mobile PC for outdoor applications. It enables remote set-up of the product to fit the application's needs. The software can easily program parameters like tank height, measurement units (meters, feet), level, distance and open channel flow.

### Benefits

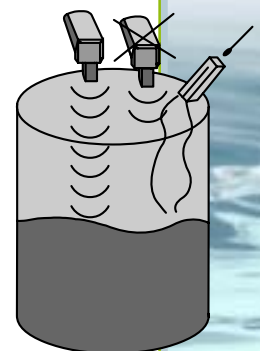
- Product set-up and operation
- On-screen view of process
- Live monitoring
- Fast production of diagnostic reports



## → Tips for correct installation

To receive correct measurement readings when installing Solid's ultrasonic products the following steps should be taken:

- Make sure that the sensor is mounted above the dead-zone area.
- The sensor should be positioned at least 0.5 m (1.64 ft.) away from the tank walls, depending on the tank's height.
- The sensor should be positioned perpendicular to the surface of the target.
- Install the sensor far from noisy areas.
- Make sure that the sensor is properly attached to a secure platform.
- When measuring via pipe, the sensor should be positioned in the center of the pipe and the pipe should be parallel to the tank's side walls.





# Solid AT

For more information on Solid AT products

please visit our web site at: [www.solidAT.com](http://www.solidAT.com)

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