

WATER MEASURING DEVICES

Nearly all water takes in Otago will require measuring. There are many options for measuring devices on the market. Technology is constantly advancing so check with your supplier for the most up-to-date information.

MEASURING PIPED FLOWS

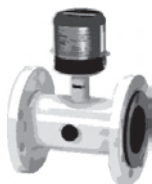
- Measuring flow in pipes is much simpler than in a river or race.
- Meters on pipes must achieve an accuracy of $\pm 5\%$.
- An important rule is that the pipe should always be full.
- Water meters must be installed in a length of pipe which has no bends, valves, or obstructions for at least 10 times the pipe diameter upstream and five times the pipe diameter downstream.

ULTRASONIC FLOW METER



These meters simply clamp on to the outside of the pipe, saving the cost of piping and flanges. For a more permanent installation, built-in devices are available. The thickness and diameter of the pipe must be measured. The time taken for water to move from one transducer to the next is timed, giving flow. They tend to be more precise at larger flow rates. Ultrasonic flow meters can be directly linked to a datalogger and/or telemetry, and require power from either a battery or a mains system. Non clamp-on devices are also available for a more permanent installation, but technically it is the same technology.

ELECTRO- MAGNETIC FLOW METER



Electromagnetic flow meters provide high-accuracy readings, especially at lower flow rates. These are also available in a clamp-on option, but long-term installations tend to be built-in. Pricing is often slightly higher than clamp-on meters, as the electrodes are mounted in a heavy duty flange which must be fitted into the pipeline. Power is required, but can be sourced from battery or mains. A datalogger can be attached with telemetry if desired.

MECHANICAL FLOW METER

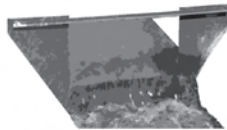


Mechanical flow meters use an impeller inserted into a flange which can be built into piped systems. The flow of the water inside the pipe pushes the impeller to spin, providing flow data. They tend to be cheaper, but have a much shorter lifespan. They require regular replacement, reinstallation and verification which can be costly. They are unsuitable for situations where the water is very silty or full of weed which will quickly chew out the impeller. It does not require an electricity supply, unless it is coupled to a datalogger.

MEASURING OPEN CHANNELS

- Measuring flow in open channels is generally more expensive and more involved than piped flow systems.
- Many farmers prefer to make the extra effort at the outset to get their take through a pipe, as it could save them several thousand dollars.
- Where it is not possible to take your water into a full pipe, devices are available which can measure flow in open channels to the required accuracy of +/-10%, or better.
- These water measuring devices all measure the height of the water. This measurement is then converted into flow data using a calculation specific to the channel being measured.

WEIRS



When measuring flow in an open channel, it is vital to have a uniform section of channel which will not change. A normal irrigation race, for example, will change over time through the growth of weeds, slumping of the banks, and debris accumulating. At some point in the creek or race where you want to measure, there might be a cutting through rock, or perhaps an old box structure securing the banks against change. Making it an ideal place to measure. If not, a weir may be the best option. Installing a weir is a technical process, but pre-fabricated weirs can be installed for a reasonable cost. A weir will not measure your water-use, but may help the measuring device do its job.

PRESSURE TRANSDUCERS



These are capable of measuring the height of water as pressure increases with water depth. This measurement is then converted to flow using calculations developed specifically for the channel in which the device is installed. Scientific quality pressure transducers can provide good quality data at a reasonable price, but will require calibration more often than other devices. They also tend to have a shorter lifespan than other devices. Remember to ask your installer how long this device will remain accurate and clarify the re-calibration requirements.

ULTRASONIC FOR OPEN CHANNEL



Ultrasonic measuring devices are typically installed directly upstream of a weir or box. They measure the height of water by bouncing sound waves off the surface of the water and timing how long they take to return. This can be an accurate means of measuring height, but quality varies and some may be affected by fog. Ultrasonic devices have no moving parts, do not touch the water, and often have built-in dataloggers. Power requirements can be higher.

STILLING WELL



This is a proven method of measuring the height of water. A well is installed next to the channel and inlet pipes take water from the channel into the well. The height of water in the well is then the same as that of the channel. A float moves up and down with the water level. This is relayed to an encoder which measures the height. This is then recorded on a datalogger and can be telemetered or downloaded manually. The height recordings still need to be transformed into flow data using the rating. Float and encoders can be accurate, but will require a trained hydrologist to maintain.

GAS PURGE BUBBLER



This system relies on measuring the force required to move an air bubble out of the end of a pipe submerged in the channel to find the depth of water in that channel. This system can be accurate, but requires a specialist to set up and cannot be mechanically dampened. Because all electronics can be installed a reasonable distance from the water, this system can be ideal for sites where equipment could get washed out.

CAPACITANCE PROBE



Capacitance probes are more useful for short to medium periods and are unlikely to provide accurate measurements over a longer period as required by the RMA regulations and consent conditions. They may be useful for short-term consents or investigations.

DATALOGGERS AND TELEMETRY

A datalogger records the volume and rate of take at preset intervals from a water meter. Telemetry equipment is attached to the datalogger and communicates water take information through the cellular network (where available) or radio waves directly to a home computer or webpage.

Several companies are available to collect the information from your take and make useful graphs and data tables in a webpage for you to access. A fee is charged for this service. Make sure you get quotes from different providers to weigh up which system will suit you best and of course at what cost.

COST

It is a good idea to estimate the cost of buying, installing, and maintaining the measuring site over the life of your consent, instead of just looking at the initial set-up cost. The lowest price may not be the best or cheapest option in the end. Make your decisions based on longevity, reliability, and ease of use.

ORC can help you in your decision-making. Some situations may require exemptions to install devices below the point of take. Contact ORC for any questions regarding water measuring and consents.

FUTURE-PROOF YOUR SYSTEM

Using one connection to send information to a web platform, may save you money. You may be able to collect telemetered information from all of your takes and perhaps your neighbour's. To do this you will need to ensure that all devices are compatible. You may also benefit from larger buying power through larger equipment orders and better service.

Future-proofing also means installing equipment which will do the job for at least the life of your consent. The RMA regulations tend to be less stringent than modern consent conditions, so be sure to install a device which will hold you in good stead, even once you have renewed your consent.

Call ORC if you are unsure which consent conditions are attached to more modern consents. Think ahead and save money!