

Water measuring and metering

Installing a flow-meter or water measuring device in a closed conduit system

Task 1

Select the most suitable flowmeter or water measuring device for your irrigation system.

Task 2

Ensure correct installation.

This is critical and professional installation is recommended, although self-installation is permissible for some devices. It is a waste of time and money to have a flowmeter (or water measuring device) not measuring accurately to specifications. Incorrect installation, or use of a flowmeter in ranges either below or above its calibrated capacity, can result in significant inaccuracies resulting in non-compliance.

Who can install my flowmeter?

Environment Canterbury's authorised installers can be found at: ecan.govt.nz/watermetering

Installation considerations

Electronic (electromagnetic and ultrasonic) flowmeters and water measuring devices typically can only be installed by a qualified technician. Insertion type flowmeters also require specialist installation. Data-logging devices and associated telemetry systems are also highly specialised and will require qualified technicians to install and configure. If you choose to self-install, Environment Canterbury will inspect your flowmeter and if it is not compliant with the Standard, you will be required to bring it up to the Standard (at your expense).

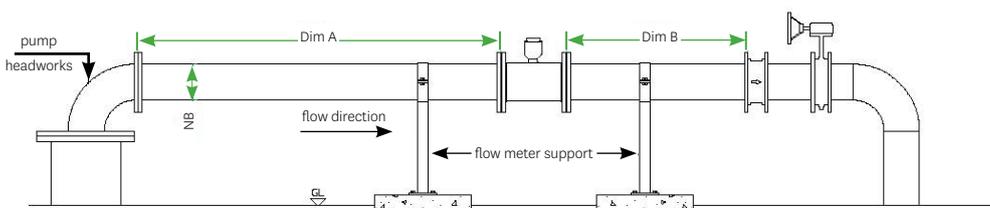
Water flow

Flowmeters/water measuring devices are designed to measure water flow free of disturbances through straight lengths of pipe. Disturbances include pumps, filters, sieves, elbow bends, valves, or changes in pipe size.

- Environment Canterbury requires all flowmeters/water measuring devices be installed with a minimum length of 10 pipe diameters of straight pipe upstream of the meter, and a minimum of five diameters of straight pipe downstream to minimise flow disturbance.

Example: if your flowmeter has 200 mm pipe there must be 2 metres of straight pipe before the device and 1m after it. This may be a horizontal or a vertical configuration as shown in the diagrams below.

Flowmeter - above ground installation (steel headworks)



Straight pipe lengths

NB	Pipe OD	Pipe ID	Dim A	Dim B
50	60.3	52.5	525	262
80	88.9	77.9	779	390
100	114.3	102.3	1023	511
150	168.3	155.6	1556	778
200	219.1	209.5	2095	1048
250	273	263.4	2634	1317

Notes

All dimensions are in mm

NB: Nominal bore

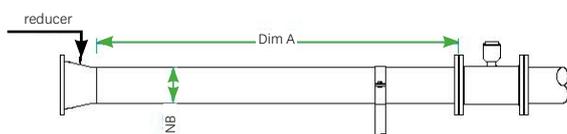
OD: Outside diameter

ID: Inside diameter

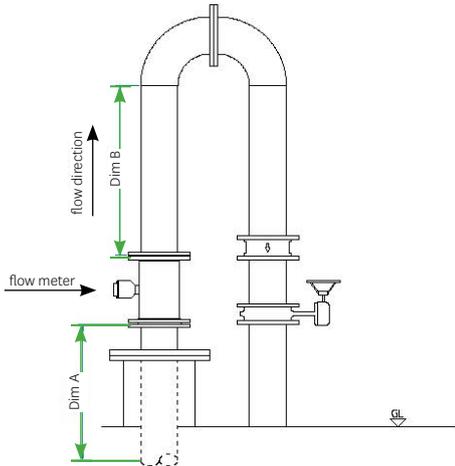
Pipe ID is based on common available steel pipe sizes

For sizes not listed use - 10x ID for Dim A

- 5x ID for Dim B



Flowmeter - above ground installation (steel headworks)



Straight pipe lengths

NB	Pipe OD	Pipe ID	DimA	Dim B
50	60.3	52.5	525	262
80	88.9	77.9	779	390
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Caution

If this type of headworks is adopted specific design will be required for thrust and support

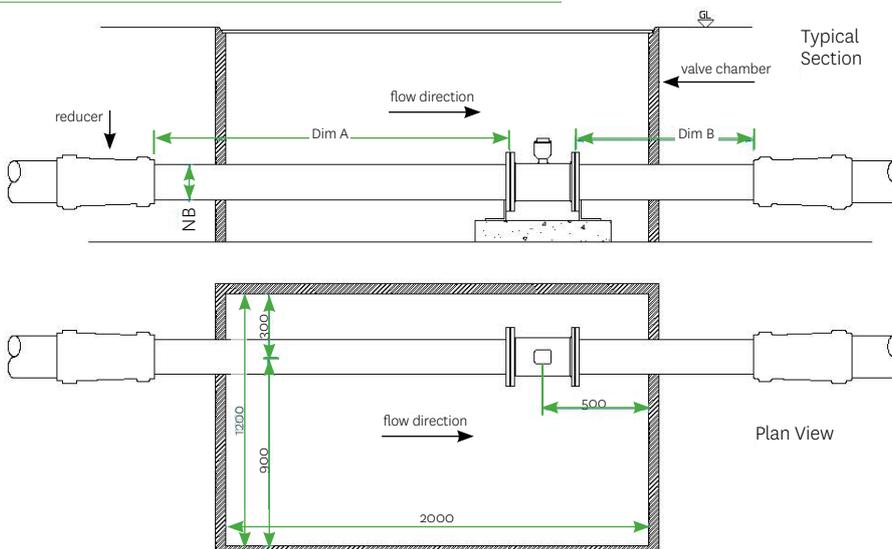
Butterfly valves, booster pumps and flow switches should preferably be installed downstream of the flowmeter/water measuring device.

Location

The correct placement of a flowmeter/water measuring device is critical to ensure accurate readings. Some sites will require detailed analysis to determine the best metering system, which should take into account:

- Flowmeters/water measuring devices are to be located as close as practical to the point of abstraction and preferably on the discharge side of the pump to reduce interference.
- Between the point of abstraction and the flowmeter only permitted offtakes are allowed (e.g. domestic, stock water and firefighting).
- The measuring mechanism of the flowmeter/water measuring device must be located in straight clean pipe of uniform circular cross section and without any fittings or obstructions. In all cases the flowmeter must be installed so at varying flow rates there is a full pipe of water on both the intake and discharge sides of the device.
- The preferred location of all devices is above ground, however, no flowmeter/water measuring device shall be installed deeper than 1.5 metres below ground level.
 - Where a flowmeter/water measuring device is installed underground sufficient space must be provided to allow access for maintenance and reading. Devices located 0.5 metres below ground will require a box to be built around the meter which will allow full access to the meter.
 - For meters located between 0.5 metres and 1.5 metres, an access pit must be provided as in the diagram below.

Flowmeter - below ground installation (PVC mainline)



Straight pipe lengths

NB	Pipe OD	Pipe ID	DimA	Dim B
50	60.3	52.5	525	262
80	88.9	77.9	779	390
100	114.3	102.3	1023	511
150	168.3	155.6	1556	778
200	219.1	209.5	2095	1048
250	273	263.4	2634	1317

Notes

All dimensions are in mm
 NB: Nominal bore
 OD: Outside diameter
 ID: Inside diameter
 Pipe ID is based on common available steel pipe sizes
 For sizes not listed use - 10x ID for Dim A
 - 5x ID for Dim B

Special cases requiring inspection/approval

- Where an existing system does not have sufficient straight-pipe to meet requirements Environment Canterbury will need to inspect and approve installation on a case-by-case basis.
- It may be acceptable for the meter to be installed with a minimum of five diameters of straight pipe upstream and three diameters downstream, however this will only be considered once an application is made to Environment Canterbury including a photograph of the existing set up.
- Applications for inspection and approval should be made on the nonstandard approval form (www.ecan.govt.nz/watermetering) and sent to:
The Manager Water Metering
Environment Canterbury
200 Tuam Street
PO Box 345
Christchurch 8140
or Email: water.metering@ecan.govt.nz

Special cases not requiring inspection/approval

- In instances where it is impractical to install a flowmeter/water measuring device with the same diameter of pipe work, (e.g. 80mm meter into 80mm pipe work), it is acceptable to install a smaller meter (e.g. a 50mm meter into 80mm pipe work). However this is conditional on the installation of a 6-to-1 ratio taper followed by ten diameters of straight pipe upstream of the meter. Similarly, five diameters of straight pipe are required downstream of the meter followed by a 6-to-1 ratio taper back out to the existing pipe work. In these instances, the resultant flow must still be within the specified flow parameters of the flowmeter/water measuring device.
- In instances where the flowmeter/water measuring device is not located at a fixed point and is used in conjunction with a portable pump, the device and associated pipe work can be disconnected from the portable pump for transportation and relocation.

Additional requirements

- Where it is likely that air may become entrapped near the flowmeter/water measuring device it is required that a single or double acting air valve be installed for its removal. Entrapped air in the system can cause a device to over-read, not function at all, or cause excessive wear (particularly in mechanical flow meters).
- A flowmeter/water measuring device shall be installed such that it and the required straight length of pipe specified above are completely filled with water under operating conditions. Non-pressurised systems may require elbows or pipe elevation to ensure that this requirement is met.
- Any filtering equipment must be installed on the intake side of the flowmeter/water measuring device.
- In instance of where a backflow preventer is required this is to be installed on the discharge side of the flowmeter/water measuring device.
- The operating flow velocity range of the flow must be within the limits provided by the meter manufacturer.
- In the instance where the flowmeter/water measuring device is to be fitted to PVC or polythene pipelines, it must be supported by a concrete thrust block or fabricated steel bracing to ensure stability and to limit vibration.
- The flowmeter/water measuring device must be accessible at all times and mounted in such a way that allows both easy and safe access. Usually this means having no obstructions to reading the flowmeter/water measuring device and/or the display unit.
- The flowmeter/water measuring device must be installed in the correct direction of flow.

Security

The flowmeter/water measuring device shall be sealed (i.e. tamper proof) so there is no possibility of dismantling, altering or removing the flowmeter/water measuring device or any supplementary devices (e.g. transmitters, dataloggers, telemetry equipment etc) without visibly damaging the protective devices. This can be best achieved by the fitting of tamper tags or in the case of dataloggers and cable junction boxes, tamper tape.

Power and earthing requirements of flowmeters/water measuring devices

- Manufacturer's installation standards must be rigorously adhered to particularly in respect to the earthing of electromagnetic flowmeters. Particular attention must be paid to the possible existence of stray current.
- Electric fence units should not be housed and located close to a flowmeter/water measuring device (they are known to affect the operation and in particular their data quality. Similarly electric fence units earthing should be isolated away from the pump shed and any pipework.
- If a flowmeter/water measuring device relies on mains power, provision should be made so that the power supply cannot be deliberately interrupted resulting in stoppage of the flowmeter/water measuring device recording. Devices with back up battery are recommended.

Aggressive environments

- Where the potential for the flowmeter/water measuring device (and its sundry equipment) is to be located in an aggressive environment, it shall be protected from risk of damage due to external environmental conditions (such as corrosion etc). All flowmeters/water measuring devices should be stock proofed.
- The IP or NEMA environmental enclosure rating for the flowmeter/water measuring device and systems should reflect the degree of enclosure protection required for the environment to which it is being installed.

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