

Automating your irrigation



What types of automation are used in irrigation systems?

The use of technology to perform tasks with minimum human input is known as automation.

In the Burdekin Irrigation Project (BIP) four types of technology are used to automate the task of starting or stopping an irrigation system.

Pump timers

Pump timers are a straightforward technology that enables growers to manage the duration of an irrigation set by automatically switching water off at a predetermined time.

Timed actuators

A timed actuator semi-automates two irrigation events. It consists of a manual timer that controls a T-junction valve, which switches the irrigation water from one set to the next. However, the pump needs to be manually started for the first irrigation event and manually turned off after the second irrigation event. This final task can be automated using a pump timer.

Remote controls

There has been an increased interest amongst growers in the use of remote pump controllers in the form of mobile phone apps to turn pumps on and off. These systems have the potential to receive and respond to data such as soil moisture and rainfall, as well as send and receive instructions.

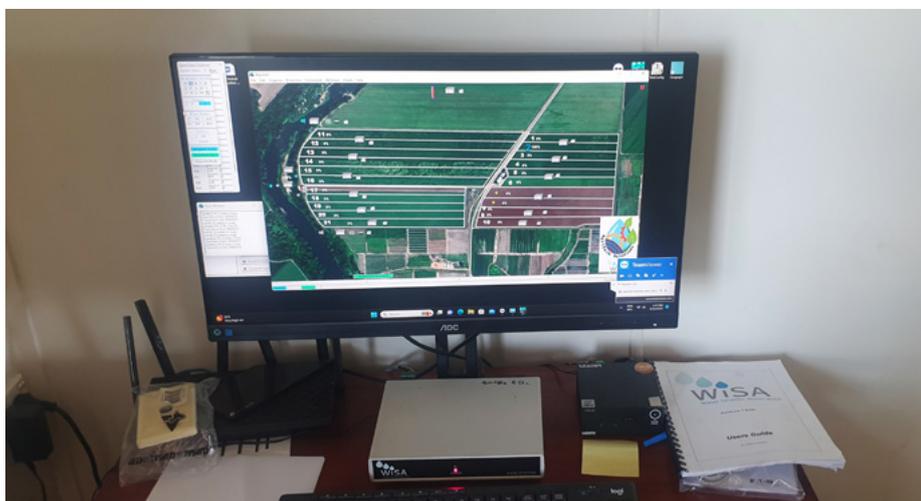
Automated irrigation systems

An automated irrigation system is composed of both hardware and software components that are used to monitor and control valves and pumps. This allows the system to switch between sets. The software includes an irrigation scheduling tool that considers weather conditions and block characteristics, such as soil water-holding capacity, crop stage/phase, and time since the last irrigation event or rain. The duration of each irrigation event is set by the grower. The software can be accessed using a remote desktop computer or a mobile phone, and these devices can be used to manually start or stop irrigation events. The system keeps a record of all irrigation events. These records are useful for reviewing system performance, estimating crop water demand, and benchmarking. Sensors, such as pressure gauges and flow meters, are used to monitor the performance of the irrigation system and act as a fail-safe should anything go wrong (e.g., a valve not open or a low water level in a recycle pit).



A pump timer turns a pump off at a predetermined time.

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A cloud-based platform is used to control and program a fully-automated WISA irrigation system.

In the system above, the duration of each event is set by the grower. To make the system more automated, end-of-row sensors can be installed. These sensors will detect when enough water has reached the bottom of a set and then switch to the next set. End-of-row sensors account for factors that are difficult to model accurately, such as spatial changes in soil type, weeds and lodging.

The choice of automation technology will depend on what a grower is trying to achieve, what the technology offers, and the cost of the investment. Important cost considerations include parts and installation, block size and farm complexity, as well as compatibility with long-term plans. Block size is an important determinant of investment pay-back time, and complexity will magnify costs. Tools that are incompatible with plans to upgrade hardware or software might increase long-term costs as well.



Fluming with electronic actuators that can be remotely opened and closed via signals received from the field radio.

What are the benefits of automated irrigation?

One of the main advantages of pump timers, timed actuators and remote controls is that they allow you to avoid the need to be physically present on-site to start, switch and stop irrigation sets.

Automated irrigation systems offer two significant benefits. Firstly, they improve the ability to match water supply with the crop's water demand, which can result in reduced water and energy costs if blocks have been historically over-watered. Alternatively, it can increase yields by minimising water stress on blocks that have been under-watered.

The second main benefit is reduced labour time.

Additional benefits include the ability to change irrigation schedules remotely, take advantage of off-peak electricity rates, and schedule irrigation at any time of the day.



End-of-row sensors can be used to tell an automated irrigation system when to shut off or switch to the next set.

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Attribute	Technology*			
	Pump timers	Timed actuators	Remote pump controllers	Automation
Brief description of technology	Turns pumps off after a specified time	Opens the second valve of a T-piece, then closes the first valve	Turns pumps on and off	Turns pumps on/off; opens and closes valves
Setting up or configuring	On-site	On-site	Remote activation via a SIM card	Remote via cloud or a computer
Able to be fitted to all valve outlets?	Not applicable	Suited to T-pieces with butterfly valves	Not applicable	Suitable for elbows, T-pieces, cylinders with 1, 2 or more outlets
Does it record irrigation management?	No	No	No	Yes
Is the schedule programmable in advance?	Duration of a single event only	Duration of a single event only	Brand and model dependent	Yes
Does it monitor the system and provide feedback?	No	No		Yes – pressure, water height, flow, rain, soil moisture, etc.
Does the technology have fail-safes if something was to go wrong?	No	Yes – once set in motion, one side of the valve must always remain open		Yes – rules are created; they use the data collected by the monitoring system
What communication system is required for operation?	None	None	Mobile phone network	Licence-free radio network between base station and field radios
Interacts with IrrigWeb	No	No	No	Yes – irrigation records and rainfall are automatically transferred

*An automated system comes with features such as fail safes and programming capabilities. Designing and installing a system with the other tools listed here that includes these features might come at an additional cost.

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What changes must take place to successfully automate my irrigation system?

To help growers achieve their irrigation management goals, the BIP begins with a baseline assessment of their farm practices and infrastructure. Based on the assessment, a range of changes may be needed, such as weed control, laser-levelling, or upgrading pump and pipe infrastructure to successfully implement a new irrigation regime, such as high-flow cups.

What skills and maintenance schedule will I need to automate my irrigation?

Automated irrigation skills, such as computer literacy, should not be a barrier to adopting this technology. Where needed, the BIP delivery team will provide training to growers on how to set up, manage and run these systems.

To ensure that the tools supported by the BIP last for as long as possible, the project has rebates available for tools that have been tested under local conditions and are backed by local service providers and component suppliers. Components that include moving parts, operate under pressure, and are exposed to the elements will have shorter service lives.

Where can I find out more about the BIP?

The BIP is a collaborative initiative of Sugar Research Australia (SRA), AgriTech Solutions, Burdekin Productivity Services (BPS), the Burdekin Bowen Integrated Floodplain Advisory Committee (BBIFMAC), Farmacist, James Cook University (JCU) and the Department of Agriculture and Fisheries (DAF). The BIP is overseen by NQ Dry Tropics. The BIP is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.

To learn more about the BIP and its allied projects, contact **Terry Granshaw**, SRA District Manager - Burdekin
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