Sales Application Note

Irrigation

APPLICATION

Irrigation is the artificial application of water to the land or soil. It is mainly used to assist in the growing of agricultural crops in dry areas or during periods of inadequate rainfall. Thanks to irrigation, production can be increased up to 3 times in comparison to the production without irrigation in the same area.

On the other hand, the energy consumption in irrigated agriculture is approximately 25% of the cost of production, while much of this cost is generated by the pumping system. Some of the irrigation types were pumps are used are called drip or by sprinklers

APPLICATION REQUIREMENTS

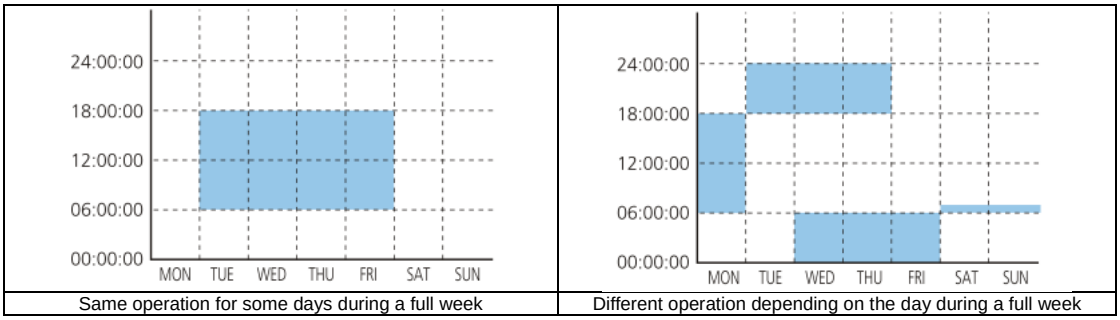
To irrigate is to supply water to crops in order to attend their water needs, allowing efficient water use to maximize the productivity/quantity of water applied. But to make the irrigation is necessary a set of techniques that, if properly planned and put into operation at the right time, will contribute significantly to increase productivity.

FUJI ELECTRIC SOLUTION

FRENIC-AQUA is equipped with up to 4 PID controllers to get the desired pressure and real time clock which allows setting up to 4 working patterns. With FRENIC-AQUA, a full control system for irrigation can be done without adding an external controller.

A PID control is a regulation system involving the set value (SV – pressure/flow command) and a process value (PV - Feedback, measure of real pressure or flow from a transducer). From these two values the difference, or error, is calculated, subtracting one from the other. The PID control then adjusts its output demand (MV - pump's speed) in order to minimize the error.

Real time clock allows setting up to 4 patterns in order to schedule irrigation among the day and the week. Also a holiday's period can be set. In the other hand, because real date is kept, starting time can be readjusted by adding a correction time. So irrigation system can adapt itself to the sun cycle.

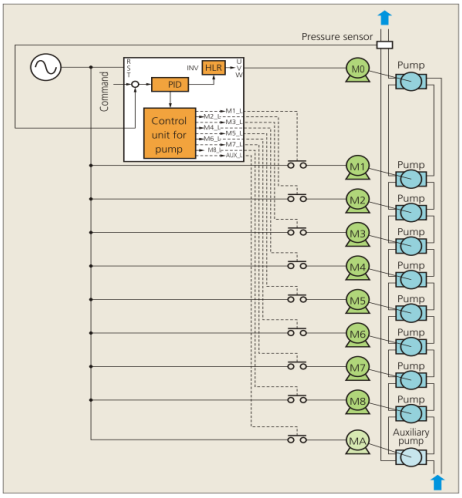


Same operation for some days during a full week | Different operation depending on the day during a full week

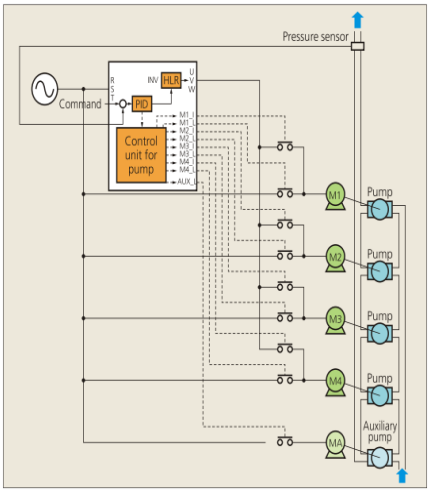
ADVANTAGES OF FUJI ELECTRIC SOLUTION

- Full power range on 3-phases 400 VAC power supply from 0,75 to 710 kW. Built-in EMC filter and DC-reactor and IP55 enclosure available on capacities from 0,75 to 90 kW.

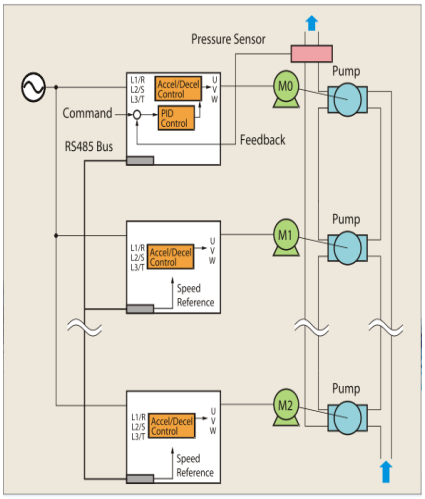
- Multifunction LCD keypad with multiple user units built-in



Control of multiple pumps on 1 regulated pump + auxiliary pumps topology (Mono-regulated pump Control)



Control of multiple pumps on multi regulated pumps topology (Multi-regulated pump Control)



Control of multiple inverters without external controller. Mutual regulated pumps topology (Mutual-regulated pump Control)

- Stop function due to low water flow (Sleep Function) for energy saving and pump lifetime
- Start-up function because of water demand (Wake-up Function)
- Operation limits (current, voltage and frequency) to protect the motor and the pump
- Pipe fill mode allows a controlled filling of pipes. Prevents water hammering and bursting water pipes, or blowing off sprinkler heads.
- Pressure sensor disconnection detection
- End of Pump Curve to detect breaks and leakages.
- Dry Pump Protection ensures lowers maintenance costs preventing pumps working when no water is in the system.
- Motor alternation prevents the pump from sticking. Additionally, an internal timer assures equal usage of the pumps
- Gradual deceleration time for check valve protection
- “By-pass” sequence integrated
- Energy saving mechanism by “Estimated end pressure control”
- Several field buses available for remote control and monitoring:
  - Built-in: BACnet MS/TP, Modbus RTU, Metasys N2
  - Optional: LonWorks, Ethernet, Profibus, DeviceNet, CANopen, CC-Link