7. Manual Fallback Mode

AOFS supports **manual fallback operation** for farms without fully automated actuators.

- **Purpose:**
  - Ensure irrigation and critical farm operations can continue when automatic valves or pumps are unavailable.
  - Maintain safety, compliance, and event logging even with manual operation.
- **Operation:**
  - Field Controller generates **step-by-step instructions** for operators:
    - Which pump to switch on/off.
    - Which valve to set to open/closed or partial position.
    - Timing recommendations based on **irrigation schedule, soil moisture, tank levels, and weather conditions**.
  - Operators acknowledge each action in the system.
- **Energy-Aware Integration:**
  - If Energy-Aware Operation is active:
    - The controller calculates **available energy** for the scheduled events.
    - Alerts operators if performing the manual steps would **exceed available energy**.
    - Supports prioritization: some irrigation zones may be skipped or deferred according to urgency levels.
- **Logging & Documentation:**
  - All manual actions **must be logged**:
    - Operator ID
    - Action taken (pump/valve)
    - Timestamp
    - Relevant sensor readings at the time (tank level, flow, battery voltage, etc.)
  - Logs are synchronized with Farm/HQ controllers whenever connectivity is available.
- **Benefits:**
  - Allows farms to **comply with AOFS even with low-tech equipment**.
  - Ensures operators follow optimized schedules.
  - Enables full **auditing and analytics** later when automation is introduced.

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