



INTRODUCTION

The ABJ control system is the nucleus of the process. The control system is “time-based” rather than “flow-based” and typically operates the following equipment:

- Decanters
- Process and Sludge Holding Tank blowers
- Air Control Valves
- Influent Valves (for SBR systems only)
- Waste Sludge Pumps
- Submersible Mixers
- D.O. System

The control system consists of a control panel including a Human Machine Interface (HMI), programmable logic controller (PLC), control switches, pilot lights and motor starters.

The control system is designed by Sanitaire and is assembled in a UL, C/UL approved shop. The control panel and the PLC program are factory tested prior to shipment. During the start-up of the ABJ system, the authorized field representative will check the installation, place the system into operation and make necessary field settings and program adjustments.

After the system has been placed into service, there are minimal adjustments required by the operator such as sludge pump start and wasting times and blower run time. These adjustments are made through the HMI interface.

PROGRAMMABLE LOGIC CONTROLLER (PLC)

The PLC contains a microprocessor, memory and input/output devices. It controls all of the process operations, monitors equipment status and alarm conditions. A backup battery protects RAM memory with further memory protection from an EEPROM or flash memory. The PLC has LED indicators showing Run, Fault and Battery Low status. Typical scan time is 1 ms/1k ladder logic. The PLC is equipped with a RS232 port for direct modem communications. In addition, the PLC will also include a DH+ or Ethernet communication ability to communicate with an operator HMI and SCADA system.

HMI

The ABJ process uses a HMI (Human Machine Interface) for graphical representation and monitoring of all plant alarms and events. The HMI consists of a non-PC interface that mounts in the main control panel door. It will be either a full color screen type or a simple monochrome unit that serves as a back up to the SCADA system. The HMI allows the operator to make changes to setpoints and display the cycle times.

The alarm page provided with the HMI allows the operator to see what alarm has occurred with a time and date stamp. The operator can acknowledge and clear alarm faults.

SCADA SYSTEM

The ABJ process uses a SCADA (Supervisory Control and Data Acquisition) system for graphical representation and monitoring of all plant alarms and events. The SCADA system consists of a computer, printer, UPS, Windows 2000, RSVIEW32 HMI software and other software as needed. The SCADA software allows the operator to make changes to setpoints and displays the cycle time, phase of each tank and the time remaining in each phase. If level transmitters are installed in the tanks, the screen can display the depth of water in each tank.

The alarm viewer provided with the SCADA system allows the operator to see what alarm has occurred and tell the operator if it is a high, medium or low priority alarm. All alarms displayed are date stamped so the operator can see the time and day that the alarm occurred. The operator can print the alarm page on the provided printer. The operator can also acknowledge and clear alarms at this screen. The SCADA system is also equipped with trend charts. The trend charts allow D.O. levels and other process related items to be displayed and charted. This gives the operator the ability to monitor the levels over a period of time. The values are also exported to a .mdb file so the plant personnel can use a spreadsheet program, such as Excel to view the values and print them out.

CONTROL SWITCHES AND PILOT LIGHTS

Control switches and indicating lights are provided on the control panel for ABJ furnished equipment. In addition, a local control box at the basin permits the manual raising or lowering of the decanter in the tank.

During normal operation, equipment selector switches are placed in the "Auto" mode. Manual operation is also possible but does not provide the process interlocks that are incorporated with automatic operation.

If a component is not used or has failed, it can be switched to the "Off" position and the control system will continue without the function of that item.

MOTOR CONTROL CENTER (MCC)

The Motor Control Center (MCC) contains all the starters and overload protection devices for the various motors in the system. The MCC is separate from the control panel enclosure, which houses the PLC, control switches and pilot lights.

PROCESS AND EQUIPMENT INTERLOCKS

The control system includes switches and sensors that provide information to the PLC to prevent process upsets and equipment damage. Additionally, circuit breakers and motor circuit projectors are used to protect the motors from electrical overloads.

The decanter actuators include end position limit switches that verify that the decanter has reached the bottom water level or has returned to the "park" position. The air control valves have end position limit switches.

- If a valve fails to open, the blower is stopped.
- If the air valve fails to close, decanting is inhibited.
- If the decanter fails, the air valve is inhibited from opening.

A high water float switch or level transmitter is provided in each basin to detect flows greater than the peak dry weather conditions. Based on the float switch signal or the level rate of change, the PLC will then evaluate whether to remain in the normal cycle or switch to the storm cycle.

MODEM

A modem is installed as standard equipment in the control panel to allow the PLC, HMI and SCADA to be accessed by telephone. The PLC program can be monitored and /or modified in real time from remote locations. The HMI or SCADA can have modifications made and then download via the modem.

REMOTE ACCESS

Sanitaire can provide a SCADA package for the ABJ system that would allow remote monitoring of the plant. This is useful for small plants that are not staffed during evening or weekend hours. With remote access, the operator uses a PC and modem to interface with the SCADA from an offsite location. The operator is able to view and acknowledge alarms and monitor plant equipment without having to go to the plant.