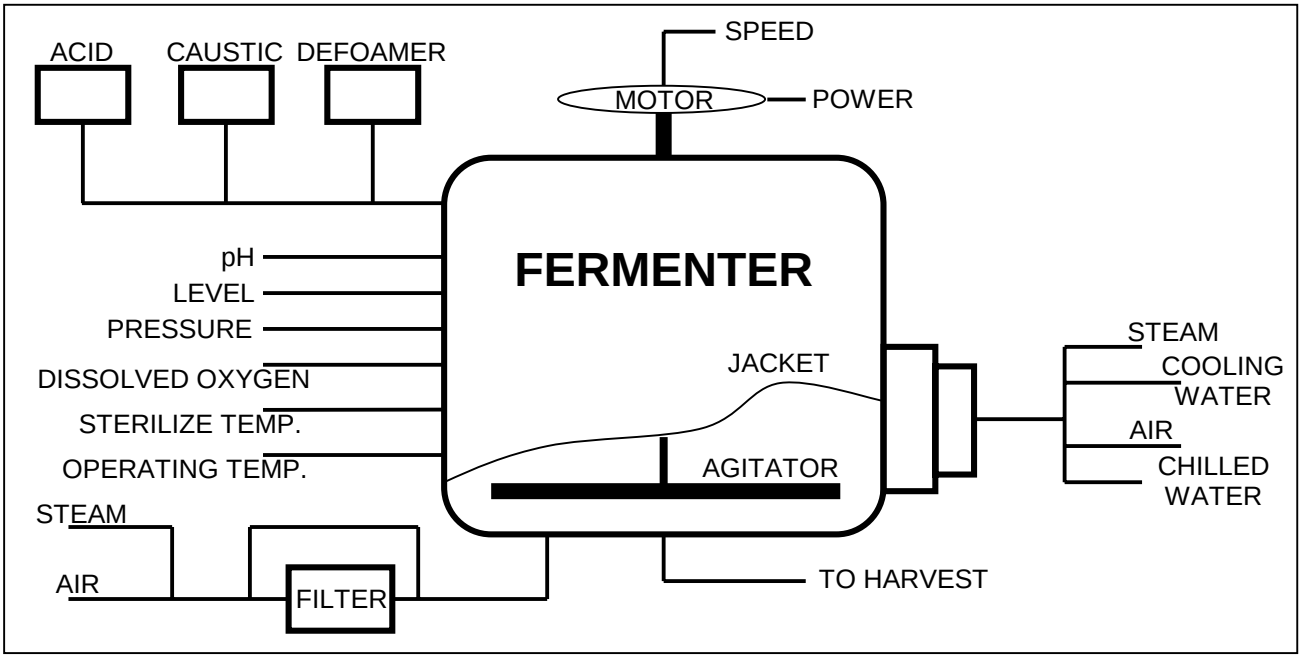
Honeywell

HC900 Production Fermenter Control

Application Brief

Industry: Food



Problem

Fermentation is a batch process performed in vessels ranging in size from a few to several thousand liters; several vessels may be sequenced to provide continuous end product production. The sequence for each vessel includes the equipment sterilization and charging precise quantities of feed stock, nutrients, and protein yeast.

Throughout the process cycle, which may last several days, precise control is required for critical variables such as pH, temperature, pressure, aeration, oxygen concentration, heat and mass transfer, and reaction time.

Data acquisition is necessary because the process involves vulnerable living organisms and must be monitored continuously to enable immediate corrective actions. Data must be obtained and stored for reports used for process analysis, product traceability, and Good Manufacturing Practices (GMP) documentation. Since requirements vary from one product to another, the control system must be able to store and execute numerous “recipes”. The HC900 Hybrid Controller recipe feature provides the ability to produce a wide breadth of product variations.

The HC900 Solution

The HC900 Hybrid Controller meets all of the requirements for safe and productive process operation with maximum operator convenience:

- Program control of sequencing and variables versus time
- Proportional (PID) modulating loop control
- Logic functions for equipment and process status
- Alarm detection, annunciation, and logging
- Data acquisition and data logging
- Recipe configuration, local storage and download capability

The HC900 Hybrid Controller receives numerous inputs and produces numerous outputs according to the recipe being executed;

- Digital (discrete) inputs including foam probes, flow switches, and valve limits
- Agitator running contacts, temperature alarm switches
- Analog inputs including temperature, pressure, flow, pH, dissolved oxygen and agitator power

Solution (Continued)

- Digital outputs for sequencing and on/off control
- Analog outputs for modulating (PID) control

Familiar operator displays provide the operator with dynamic information about the status of each run as it progresses. Alarms are announced in color on dedicated displays and can be acknowledged directly from the Model 1042 Operator Interface (OI). Product changeover is simplified as new recipes may be selected by name directly from the OI.

A single configurable database integrates both the loop(proportional, modulating) functions and the logic (discrete, boolean) functions required by the process.

The data acquisition and control capability of the HC900 permits ongoing process analysis to define and implement the control strategies while maintaining high production with safety and at low cost.

Benefit Summary

The Honeywell HC900 provides the following benefits when used in fermentor applications:

- Extensive set of advanced of loop, logic calculation, and sequencer algorithms for maximizing process performance
- Open Ethernet connectivity via Modbus/TCP protocol provides plant wide process access and data acquisition.
- Extensive equipment diagnostic and monitoring to maximize process availability
- A common configuration tool for both control and OI minimizing engineering costs
- Autotuning and fuzzy overshoot protection for quick startup and proper control operation
- Storage of up to 50 recipes for fast, error-free product selection
- Storage of up to 99 time/temperature profiles. Each profile may be part of a recipe

Implementation

Overview. The HC900 as shown in Figure 2 consists of a panel-mounted controller, available in 3 rack sizes along with remote I/O racks, connected to a dedicated Operator Interface (OI).

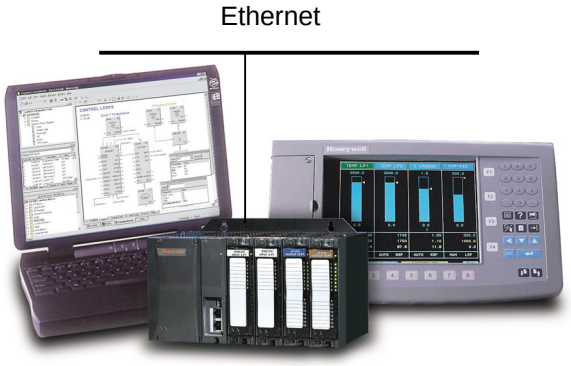


Figure 2: HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

All field signals terminate at the controller. The controller has universal analog inputs, analog outputs and a wide variety of digital input and output types. This controller will provide all the fermenter control functions.

Configuration. The Hybrid Control Designer provides advanced configuration techniques allow a variety of strategies to be easily implemented. The run-mode configuration monitoring and editing capability allows these strategies to be tested and refined as process knowledge is gained.

Monitoring. The complete operation can be monitored and controlled from the easy to use, familiar displays of the Model 1042 OI.

Data Storage. The data storage feature of the OI can be used to log process information during the cycle to an integral floppy disk for a permanent record.

Open Connectivity Over Ethernet. Use popular HMI, data acquisition, OPC server, and HC900's HC Designer configuration software over an Ethernet LAN concurrently to access HC900 controllers.

Peer to Peer Communications. Any HC900 can support up to 8 peer controllers for exchange of analog or digital data over Ethernet.