
Pumping Station Control



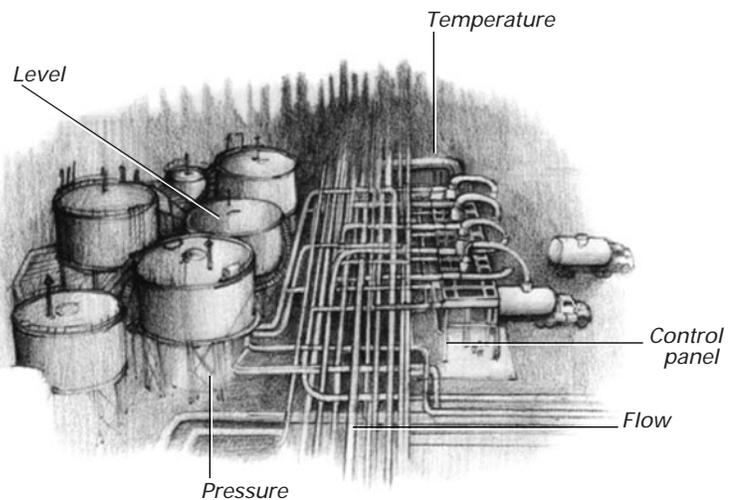
HP Data Acquisition Application Note

Description

Pumps, valves, and forced air or gas may be used to control the movement of liquids and gases from one container to another around a large facility. Additionally, tankers, aircraft, and trucks may transport gas, oil, chemicals, and milk to or from refineries, storage facilities, and factories. All require a pumping station for efficient movement of materials. A pumping station is a facility that accurately transfers a specific amount of material from one container to another. This is usually a custody transfer where accurate volume measurements are critical.

Problem

Temperature, flow, pressure, and valve position are essential items that must be controlled to enact a safe and efficient movement of a liquid or gas between one storage medium and another. A system that can both monitor and control these items is needed.



Solution

A VXIbus data acquisition and control system from Hewlett-Packard can handle the variety of monitoring and switching capabilities needed to control a pumping station. Having a complete data acquisition and control system built into a single VXIbus card allows mixing and matching of functions to handle small to large applications. Adding more cards increases system capacity without degrading system throughput.

Applications

Chemical depots
Gas/Oil depots
Polymer/Plastic storage facilities

Departments

Transportation
Shipping
Custody transfer

Implementation

Temperature

Some gases and liquids have to be transported at a specific temperature. A Hewlett-Packard data acquisition system can accurately monitor temperature using transducers like thermocouples, thermistors, and RTDs. Temperature linearizations performed directly in the data acquisition system off-load the supervisory computer which allows it to perform other operator interaction, analysis, and data display.

Pressure

Gases and some liquids need to be under a constant pressure. Pressure transducers with voltage or current outputs can be used for monitoring these pressures. Valves or pressure pumps can be turned on and off with actuators or controlled with voltage or current D/A converters.

Flow

Some liquids, such as certain types of polymers, require that compressed air or gas be forced into one container to move it to another container. The flow of this mixture is an important factor in a successful transfer. Flow meters can be used to monitor flow rate, and pumps can be used to regulate flow.

Level

Level transducers are used to monitor the level of liquid in a container to avoid overflow or to ensure that the tank is empty. Both discrete (on/off) and continuous (variable level) transducers are used.

Control panel

A control panel is usually part of the pumping station. Digital inputs sense switch positions set by the operator, and digital outputs turn on and off status lights on the panel.

Key System Features

- VXIbus open architecture
- Data Acquisition and Control on a single programmable VXIbus card (E1419A)
- Graphical programming language (HP VEE)
- Flexibility with deterministic control
- Wide choice of inputs/outputs
- Built-in control algorithms
- Up to 32 user-written "C" code algorithms
- 65,000 reading FIFO buffer
- 500 reading Current Value Table (CVT)
- All algorithms can write to FIFO/CVT
- Data can be time-stamped

Typical Configuration

Data Acquisition System	Qty
E1401B VXI 13-Slot Card Cage	1-2
HPE1419A Multifunction Measurement & Control Card	2-20
Analog input channels	10-500
Counters channels	5-60
Voltage DAC channels	10-100
Digital input channels	100-1000
Digital output channels	26-62
Computer and Software	
HP Vectra Series PC with HP 82341C HP-IB Interface Card	
HP VEE for Windows 95	
HP LaserJet or InkJet printer	