

Close loop system

The major components of a control system:

- Process (system)
- Instrumentation (sensors, final control element)
- Control algorithm

These elements are shown schematically in Figure 5, which can be used to represent many control systems.

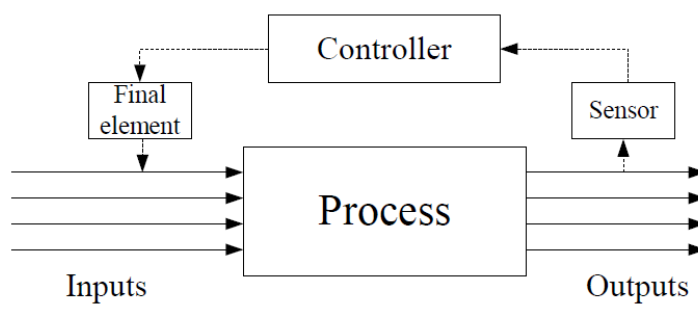


Fig.28 Diagram of a general feedback control system

Classification of variables

Classification of process inputs and outputs:

Input: The effect of the surrounding (i.e. all external variables) on the process. Usually is denoted as u .

Output: The effect of the process on the surrounding (i.e. the result of the input effect on the process variables). Usually is denoted as y .

Manipulated variables: if their values can be adjusted freely by human operator or a control mechanism.

Disturbance: if their values changes by themselves due to equipment failure or due to variation in other parts of the plants. Usually is denoted as d .

Measured variables: if their values are known directly by sensors.

Un-measured variables: if their values cannot be measured directly.

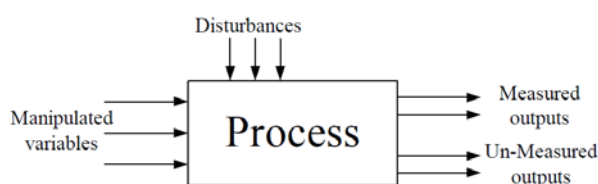


Fig.29 Classification of process inputs and outputs

Feedback system

Introduction

The feedback loop is the most commonly used type of control configuration. It is called feedback because the signal of the controlled variable is fed back to the controller. Any control algorithm can be used in the feedback loop.

The Meaning is make use of an output of a system to influence the input of the same system. The Purpose is to maintain a small deviation between the controlled variable and its set point by adjusting the manipulated variable.

Each control system contains the following:

1. The term set point is usually used for the desired value for the controlled variable.
2. The sensors are hardware to measure the physical variables that are to be maintained near their desired values.
3. The control calculation “algorithm”, which uses the measured and desired values to determine a correction to the process operations.
- 4- The results of the control calculation are implemented by adjusting some item of equipment in the system, which is termed *the final control element*.

This system contain the following signals:

R or C_{sp} : setpoint value of controlled variable, C.

C_m :measure value of controlled variable, C.

$E = C_{sp} - C_m$:error signal.

P: controller output

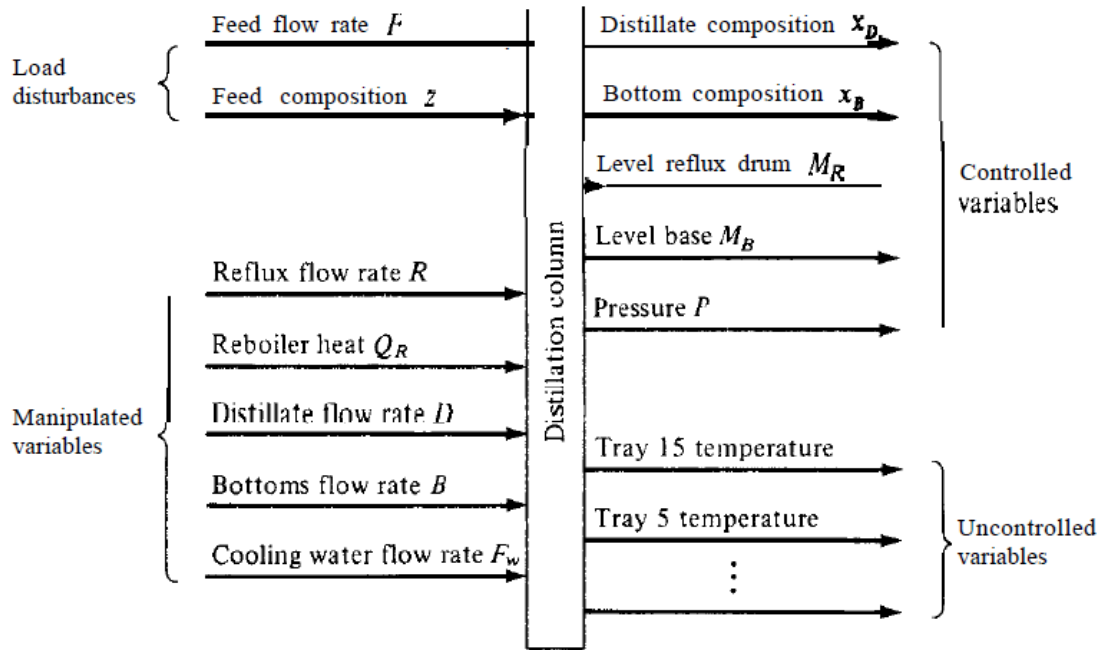


Fig.30 Types of variables